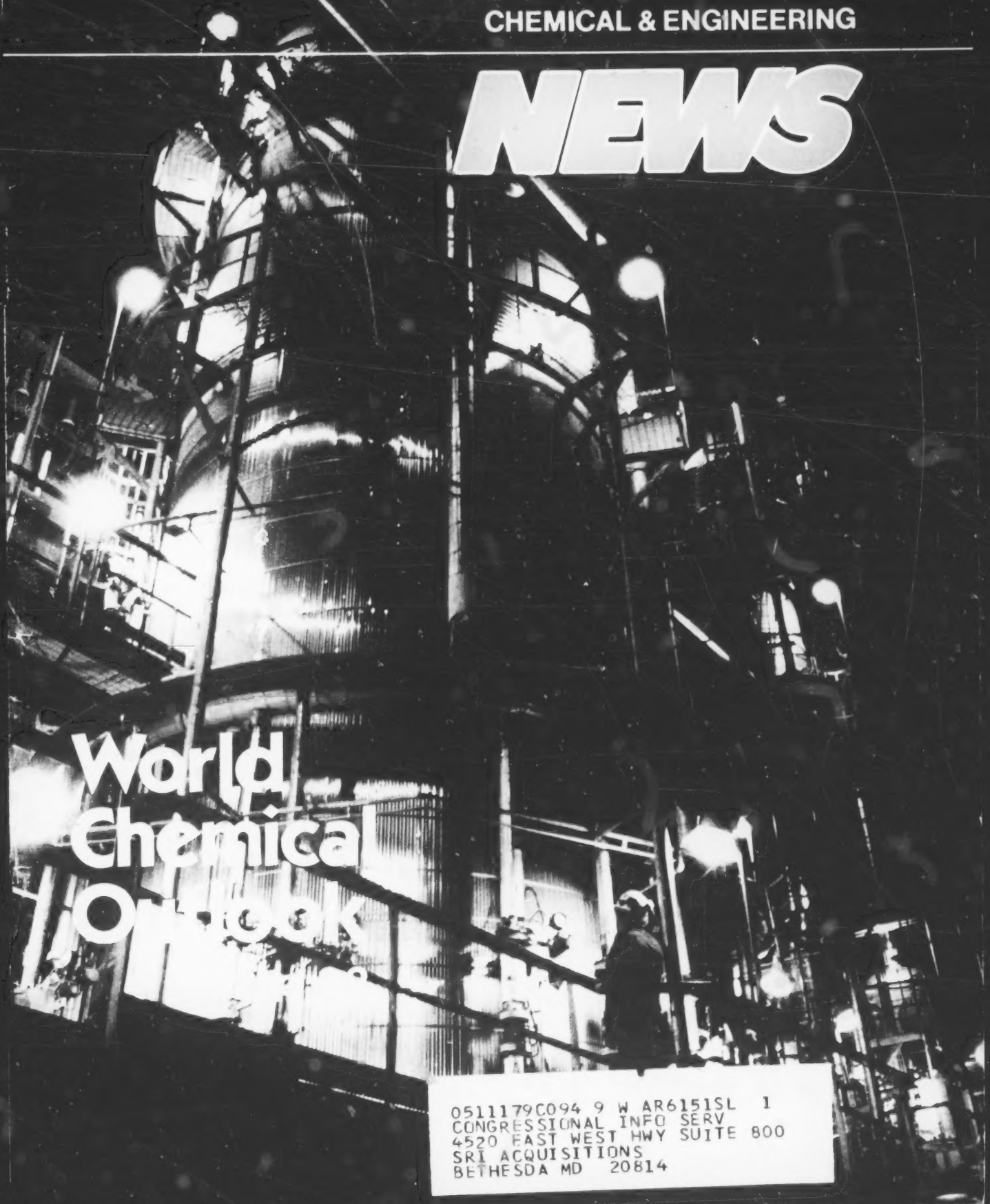
A1257-1 3/8/83

DECEMBER 19, 1983

CHEMICAL & ENGINEERING

# NEWS



## World Chemical Outlook

0511179C094 9 W AR6151SL 1
CONGRESSIONAL INFO SERV
4520 EAST WEST HWY SUITE 800
SRI ACQUISITIONS
BETHESDA MD 20814

*Cover:* Dow Canada's Ft. Saskatchewan, Alta., ethylene derivatives and chlor-alkalies complex

Volume 61, Number 51
CENEAR 61 (51) 1–78
ISSN 0009-2347

CHEMICAL & ENGINEERING NEWS

DECEMBER 19, 1983

## News of the Week

■ **Dissident stockholders win control of GAF; fate of company's chemical business uncertain.** **Page 4**

■ **New graduates will be in greater demand next year, according to the Northwestern Endicott Report.** **Page 5**

■ **Chemical Manufacturers Association forecasts strong 1984 for chemical industry.** **Page 5**

## Business

**Phenol and vinyl acetate** will show modest improvement this year but no big growth prospects are in the offing. **Page 7**

## International Business

**New foaming process for phenol-formaldehyde resin** overcomes the performance drawbacks of other phenolic resins. **Page 10**

## Government

**Chemical industry representatives** seek a better understanding of EPA's use of risk assessment in regulating chemicals. **Page 12**

## Science

**Soot, dust, and smoke from nuclear blasts** would block sunlight, lower surface temperatures to subfreezing levels. **Page 16**

## Technology

**Process control instruments displayed at the Chem Show** exhibit higher flexibility, distributed control concepts. **Page 19**

**Chemical-containing rockets fired into ionosphere** in attempts to improve satellite communications. **Page 21**

Letters 2
Editor's Page 3

**Concentrates**
Business 6
Government 11
Science/Technology 14

**The Departments**
ACS Comment 51
Meetings 52
Newscripts 78

## Special Report

**World's chemical producers are beginning to recover from the economic recession plaguing them for the past three years.** **Page 22**

## Job outlook for spring grads is looking good

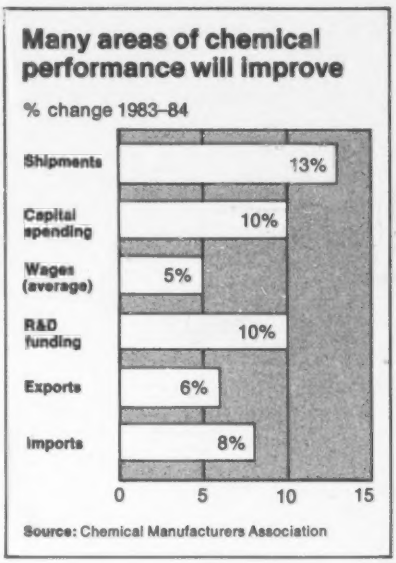
Good news for next spring's college graduates: More jobs. According to Northwestern University's 1984 Northwestern Endicott Report, an annual survey of employers' hiring intentions, major U.S. companies expect to hire about 20% more graduates with bachelor's degrees and 28% more with master's degrees than in 1983. Starting salaries will increase, but only modestly, says Victor L. Lindquist, Northwestern's director of placement.

Demand for new bachelor-level graduates is projected to rise 21% for engineers, 28% for computer scientists, 31% for chemists, 25% for accountants, 28% for business administration majors, and 10% for sales/marketing majors. But three fields show decreases in demand, compared to 1983: liberal arts, down 15%; mathematics/statistics, down 17%; and economics/finance, down 5%.

As for graduates with master's degrees, the companies that responded to the survey say they intend to hire 36% more engineers and 26% more graduates in "other technical fields" than in 1983. Demand also will rise 16% for "M.B.A. with technical B.S.," 19% for "M.B.A. with nontechnical B.S.," and 44% for accountants. Demand did not decrease for any of the master's degree categories covered by the survey.

Starting salaries at the bachelor level will rise to an average $2237 per month for engineers (up 3.5% from 1983), $2072 (up 5.8%) for computer scientists, $2016 (up 2.9%) for chemists, $1681 (up 3.7%) for accountants, $1618 (up 1.5%) for business majors, $1635 (up 4.2%) for sales/marketing majors, $1612 (up 4.2%) for liberal arts graduates, and $1707 (up 4.6%) for economics/finance majors. Although demand for math and statistics majors will drop sharply, starting salaries will rise an average 8.5%, to $1868.

For master's graduates, engineers will command the highest starting salaries (average $2580 per month), but that represents only a 2.1% increase from 1983. Masters in "other technical fields" will average $2430 (up 4.4%). Salaries will rise 5.4% to an average $2369 for "M.B.A. with technical B.S." and 4.2% to $2397 for "M.B.A. with nontechnical B.A." □




## Boom 1984 forecast for chemical industry

According to predictions by the Chemical Manufacturers Association, 1984 will be a boom year for the chemical industry. CMA's annual survey of industry executives shows that they "clearly expect the nation's economy to stay up and inflation to stay down," says Myron Foveaux, CMA's assistant director of government relations for international trade and economics.

Sales are expected to increase the most, rising 13% in 1984 above expected 1983 figures. This will bring a 24% rise in income after taxes, according to Foveaux. The increased income, he adds, will come from higher sales and not from higher prices. Plant capacity utilization is also expected to increase, even after rising from 69% to 73% during the past year, reaching about 78% in 1984.

"Capital expenditures for the first time in several years will be back in their historical growth pattern," Foveaux says. CMA projects a 10% growth in capital spending over 1983. Of total spending, about 8% will go outside the U.S., 8% will be spent on environmental controls, and only 26% is expected to be spent on new facilities. The emphasis will be on renovation and modernization of existing plants.

Costs and expenditures for the industry are expected to moderate in 1984 as well. Raw material costs will rise only 5%, following the trend of the nation's inflation rate. Fuel and electric energy costs will show the biggest increase, maybe 7% next year. The hourly wage rate also will increase only moderately, around 5%, owing to the effects of long-term labor contracts, Foveaux says.

In addition, research and development spending is predicted to rise substantially, about 10% over 1983 levels. Foveaux points out that the increase is a good one since the base for R&D spending has remained high during the recession, showing the high regard chemical companies have for research.

One of the reasons behind increased research spending may be that more companies are turning away from commodity chemicals to specialties. Foveaux says CMA sees this shift as a fundamental one, heavily influenced by the international petrochemical markets. He explains that the plants now being built in natural gas-rich countries such as Saudi Arabia, Kuwait, Mexico, Canada, and Indonesia will have a great impact on worldwide capacity for petrochemicals and will affect U.S. markets to some degree. As production shifts to these countries, it seems logical that U.S. firms will react to the change by becoming world competitive in downstream products. Foveaux sees it as a good sign that chemical exports are expected to improve 6% in 1984. Chemical imports are expected to rise only 8% next year.

Foveaux comments that the growing clamor for some kind of national industrial policy inevitably will involve the chemical industry. He says that "As indistinct and ill-defined as the term is, it seems likely that the chemical industry must eventually speak to what, if any, industrial policy should be undertaken by the government." □

# Phenol, Vinyl Acetate Head for Moderate Pickup in 1984

**Although many markets are improving, these adhesives intermediates will take time to generate new major growth justifying new investment**

**Bruce F. Greek,** C&EN Houston

In the heart of the organic chemical world, phenol and vinyl acetate are getting their share of recovery as the U.S. economy heads into what likely will be one of its better years. But behind this improvement, both chemicals have long-run problems which so far have held them back from new growth. So their producers—mostly basic chemical companies with some influence from oil and other interests—are shunning new investments at the moment.

As detailed in the following pages, both phenol and vinyl acetate have potential to do well in good business years. Their important adhesives and coatings markets strengthened dramatically in 1983. If this were the only main force at work, these intermediates would be heading into tight supply in a year or two. Their use of plant capacity likely will run more than 80% in 1984; that doesn't leave much room below the practical maximum, which is a little above 90%.

Unfortunately, both chemicals have undertows in their markets. Telltale evidence is their half-decade pause in new growth from 1979 through 1984. Some countercurrents have to be at work that these intermediates cannot overcome through new uses.

## Key Chemicals

For phenol, the problem is overdependence on construction markets, which aren't giving phenol growth proportionate to the big rise in housing starts this year and which could flatten out in 1984 if interest rates for mortgages inch up. Phenol's stake in construction is so great that its few major new applications, such as making aniline, cannot take up any slack.

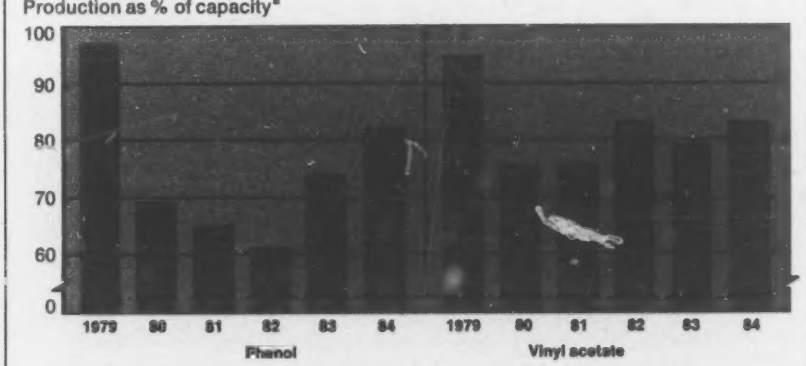
Vinyl acetate has a much broader spectrum of uses than does phenol. Some of these uses in construction have problems similar to phenol's, others are growing in line with rejuvenated gross national product, and still others, especially in copolymers with ethylene, show strong growth. Overall, U.S. markets are moving up more than 10% per year, not bad for a commodity chemical.

But vinyl acetate production continues on its virtual plateau of the past several years. The reason is export trouble. Weakness in exports is much more threatening to vinyl acetate than to most other organics because of vinyl acetate's unusually large foreign trade. At the peak in 1982, vinyl acetate exports took fully 37% of U.S. production. This year, that slice is dropping to about 30% as shipments abroad slump 20%. Vinyl acetate has fallen into the same export trap as have many other organics. After a boom in the late 1970s, exports are in a crunch in the 1980s because of the strong U.S. dollar, weak foreign economies, growing capacity abroad, and the loss of U.S. producers' former advantage in raw material hydrocarbon costs. Industry analysts expect continued export trouble for vinyl acetate over the next several years.

In the U.S., vinyl acetate has promising growth areas, notably in the copolymers, but volume is simply not enough to push total vinyl acetate production very much. For example, vinyl acetate content runs just 2 to 10% in copolymers for film, wire, and cable uses and 25 to 30% in adhesive grades.

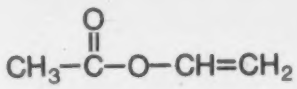
The upshot for both vinyl acetate and phenol is a long haul to fresh production growth over the level of the 1970s. The outlook is similarly modest for profitability and new investments.

**Capacity use for both intermediates will top 80% in 1984**




[a] First-quarter nameplate capacity. **Sources:** International Trade Commission, industry and C&EN estimates

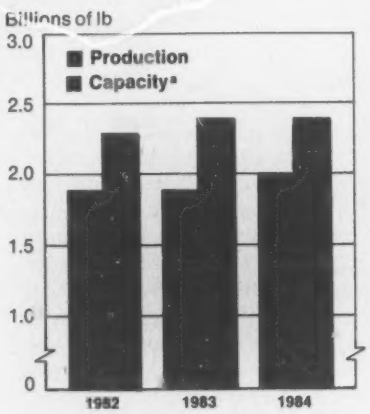
## Key Chemicals



# Vinyl Acetate

- ***Production inching up***
- ***Capacity holding***
- ***Prices may rise***

### PRODUCTION/CAPACITY




a First quarter.

### HOW MADE

*Vapor-phase reaction of ethylene, acetic acid, and oxygen*

### MAJOR DERIVATIVES (U.S.)

*Polymers 55%, polyvinyl alcohol 20%, copolymers 15%*

### MAJOR END USES (U.S.)

*Adhesives 35%, paints 25%, paper and textile coatings 20%*

### FOREIGN TRADE

*Exports—declining to about 550 million lb in 1983, imports—about 15 million lb*

### PRICES

*List prices 32 to 35 cents a lb*

### COMMERCIAL VALUE

*$600 million for production, 1983*

Vinyl acetate continues its strange stability among U.S. organics. In good and bad business climates for the past four years, production has been close to 1.9 billion lb. Industry analysts don't expect much movement off this plateau in 1984. The product has been in near-perfect balance between growth in new uses and economic recoveries and declines in exports and business downturns.

Such equilibrium would be frustrating in prior decades, when chemicals were expected to show net growth. But it hasn't been all that bad in the stormy business scene since 1979. For example, operating rates for vinyl acetate plants have stayed at relatively high levels while rates for most other organics have fluctuated wildly. And vinyl acetate has avoided the capacity binge since the mid-1970s that has ruined profitability in many other intermediates.

Vinyl acetate capacity, too, has been fairly steady over the past four years and, analysts think, will remain that way for the next two years. If production this year remains flat at 1.9 billion lb, the average plant operating rate will be close to 80% in the high range for organics. In 1984, vinyl acetate's relative standing may not be so high, since use rates are climbing month by month in basic chemicals. If analysts are right in predicting just a 5% output gain for vinyl acetate next year to about 2.0 billion lb, the operating rate will inch up to about 83%.

The increase in vinyl acetate production in 1984 will all go to U.S. markets, since exports are dropping. These highly important exports, about 30% of vinyl acetate's total market, have been falling for a year and are a big reason for the standstill in vinyl acetate production. Analysts forecast that exports will continue to fall as new capacity comes on in other countries and as other materials compete with vinyl acetate and derivatives in some of its major markets. The peak in exports was nearly 700 million lb in 1982 after a boom in the late 1970s. Export volume is sliding to about 550 million lb this year.

For practical purposes, all vinyl acetate is converted to polymers. Over half of U.S. demand goes to polyvinyl acetate, which becomes a component of paints, adhesives, and coatings for paper and textiles. These uses swing up and down with the general economy, especially areas such as housing and packaging. The early-1980s slump in housing combined with formulation changes to reduce demand growth for vinyl acetate in paints to low levels, with periods of decline during the sharpest drops in housing starts. In contrast to phenol's housing market, however, housing demand cannot by itself determine overall vinyl acetate production.

One reason is a second major market for polyvinyl acetate in adhesives and coatings. This is a highly diverse area. The adhesives go into uses such as box adhesives, labels, and sealing tapes. The coatings wind up in end products such as paper, where demand follows business levels because the major end use is magazines, whose page levels are sensitive to the economy's effect on advertising.

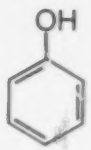
A second major vinyl acetate derivative is polyvinyl alcohol, typically about 20% of U.S. consumption. End uses for this alcohol are textile sizings, some adhesives, and many smaller categories. Growth in these uses generally is expected to be small and closely related to the growth in constant-dollar gross national product.

Further down the list of derivatives, copolymers with butyraldehyde, vinyl chloride, and ethylene take some 15% of U.S. vinyl acetate demand. Polyvinyl butyral goes almost entirely into safety glass, so its outlook depends on the state of auto production and commercial building. The other polymers go into products such as floor tile and plastic film. As a group, these vinyl acetate derivatives likely will have above average growth rates, analysts say. However, copolymer demand is too small to have much influence on total vinyl acetate volume.

Still, copolymers could be a major offset to export weakness for vinyl acetate in 1984. This, combined with any general market boost from expected good business conditions next year, could give vinyl acetate a reasonably good financial performance. Conditions are firm enough at present that major producers are attempting a price increase to help bring in the new year.

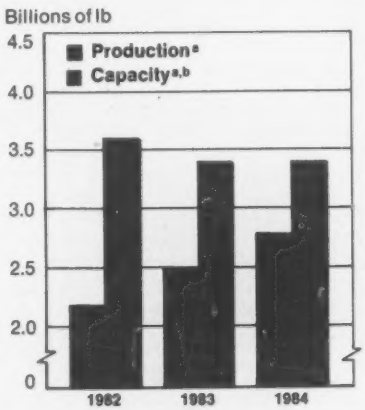
## Key Chemicals

# Phenol




- ***Production rising***
- ***Capacity flat***
- ***Prices off slightly***

### PRODUCTION/CAPACITY




a Synthetic only. b First quarter.

### HOW MADE

*Peroxidation of cumene (isopropyl benzene) and cleavage to phenol and acetone*

### MAJOR DERIVATIVES

*Resins (mostly with formaldehyde as comonomer) 40%, bisphenol A 20%*

### MAJOR END USES (U.S.)

*Adhesives 60%, plastics 20%*

### FOREIGN TRADE

*Exports—declining possibly to 100 million lb in 1983, imports—probably below 25 million lb*

### PRICES

*List prices about 35 cents a lb*

### COMMERCIAL VALUE

*$850 million for production, 1983*

Phenol is finally in motion after four distressing years of poor business. The current stir includes steadily rising production, increased use of sharply pruned capacity, upward price movement, and a large-scale shift in the roster of plants. It doesn't add up yet to prosperity, but at least it's progress.

Phenol is a fairly typical big-volume organic, moving up and down with economic cycles. In 1983 production probably will top 2.5 billion lb, up more than 14% from 1982. The 1982 level was down not far from the average for organics at 15% from 1981 and 24% from the 1979 record.

For 1984, analysts predict an optimistic 10% further production gain to about 2.8 billion lb. If output gets that high—and some sources regard that figure as very iffy—it still will be below the 1979 record of 2.9 billion lb. So phenol will be finishing a half-decade pause in growth quite unexpected in the late 1970s.

The effect on plant use levels and profitability has been severe, enough to drive some producers out of this business and chop total capacity about 15% in the past two years after a 14% gain in the previous four. The worst effects of overcapacity are now over, and trimming has stopped. Capacity is now about 3.4 billion lb per year and, analysts forecast, likely will stay there for some time.

Although on paper phenol capacity is unchanged from early 1983 to early 1984, big internal shifts are taking place. Allied has completed rebuilding its large phenol plant at Frankford, Pa., which had been mostly shut down since a fire in March 1982. The capacity restoration of 500 million lb a year is in startup and probably will be capable of the full amount in 1984. Total capacity at Frankford is 600 million lb.

However, offsetting Allied's large addition will be Monsanto's exit from the business. In September, Monsanto announced that it would close its plant at Chocolate Bayou, Tex., knocking out 500 million lb of phenol capacity as well as 300 million lb of coproduct acetone.

Other small phenol units in the U.S. also did not operate for parts of 1983. With these included, analysts estimate that real nameplate capacity for the year averaged only 3 billion lb. Hence, if production reaches 2.5 billion lb this year, the operating rate at plants actually running will exceed 80%. In 1984, real capacity could be up about 13%, so actual capacity use may not rise very much.

Phenol's shock since 1979 has been due to some large mistimed capacity additions coming on stream just when phenol markets buckled. Producers have now sorted out the capacity situation but have yet to see demand recover to former levels.

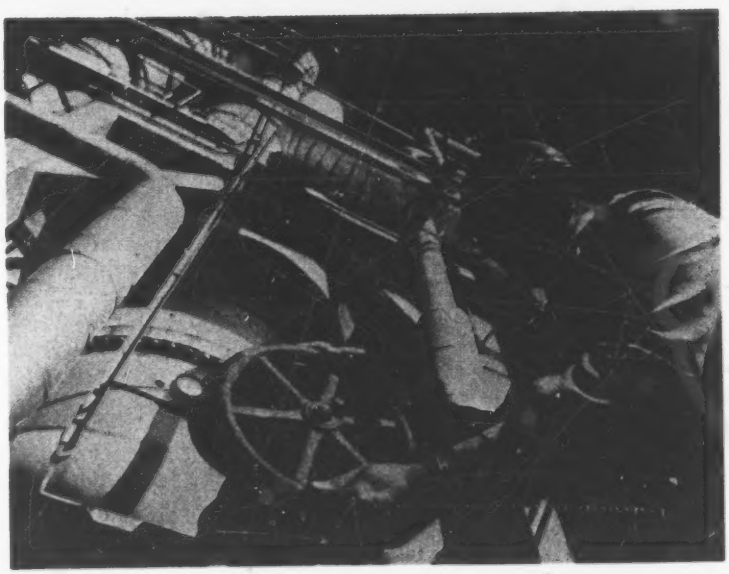
Phenol's demand problems come largely from its high dependence on housing as the end use for various derivatives. Phenol is a starting ingredient in plywood adhesives, carpet fibers, and other polymeric materials. Housing, of course, is way up from a year ago, but most current forecasts show new starts resting on a plateau through 1984. So new growth for phenol in housing may be minimal.

There's another trend worrying analysts about phenol's housing outlet. Many industry sources are concerned that the housing recovery has been only partially reflected in phenol demand. Reasons are downsizing of living space in newer houses, common components in nonfree-standing homes, and changes in materials combining to reduce unit demand for phenol derivatives.

Another important end use of phenol derivatives such as bisphenol A is automotive and other transportation products. These have recovered nicely from the recession, too, but again not proportionately so well for phenol. One big reason is that auto sales even by U.S. companies include an increasing number of full units and parts made abroad. Also, U.S. autos have in some cases switched to coatings not containing epoxies or other phenol-derived materials.

Since phenol doesn't have large specialty or other markets balancing its overwhelming influence from autos and housing, it cannot recover fully from the past four years until much later in the current business expansion. Possibly, phenol will not get any new growth this time around in the business cycle and may have to wait until the late 1980s.

World
chemical



The gloom that was so pervasive among the world's chemical producers during the past three years is dissipating. Just a year ago, output of chemicals was severely depressed and producers' profits seriously eroded.

Now, recovery clearly is under way for the chemical industries of Europe, Japan, Canada, and – especially – the U.S. This year's results look so good, to be sure, only when they are compared with the unsavory conditions of the two previous years. Stacked up against the robust record of the late 1970s, they still leave much to be desired.

Even so, demand for chemicals is trending upward. And the moves that were forced on the industry during the recent period of depression to trim costs, boost efficiency, and generally streamline and consolidate its operations leave it in a much stronger position to capitalize on its recent gains.

Problems still cloud the horizon, nevertheless. The industry remains burdened with more plant capacity for many major chemicals and polymers than it has any need for. Competition in world markets is cutthroat, a problem that has been exacerbated for U.S. producers, who have lost much of their former cost advantage. And the problem will only worsen as petrochemical plants in the Mideast and Latin America vie for a bigger share of world trade in chemicals.


United States ..... 24

Foreign Trade ..... 27

Western Europe ..... 32

Japan ..... 41

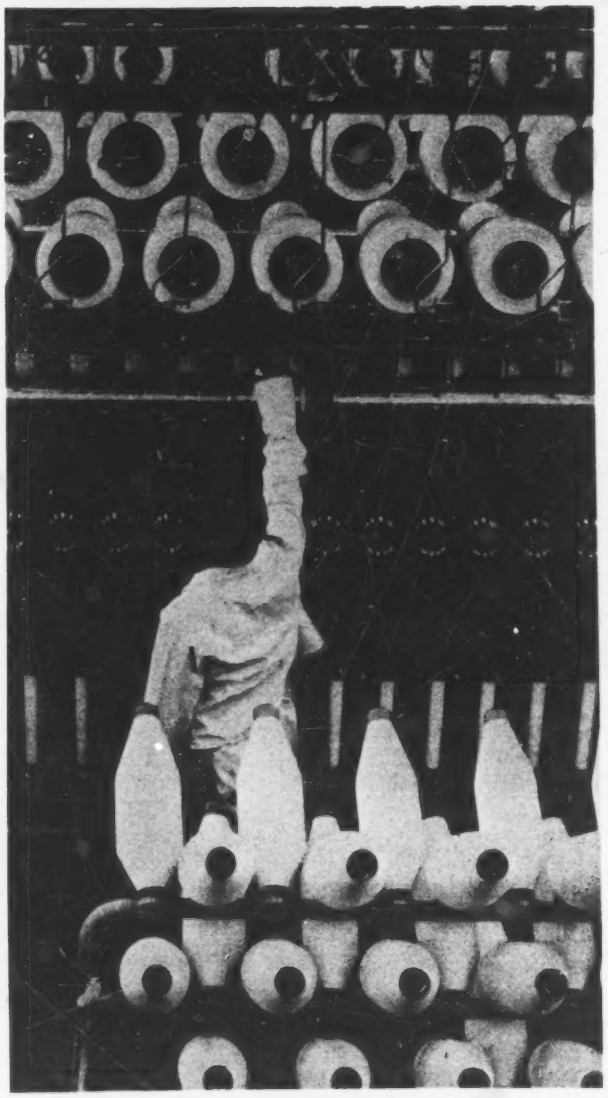
Canada ..... 44

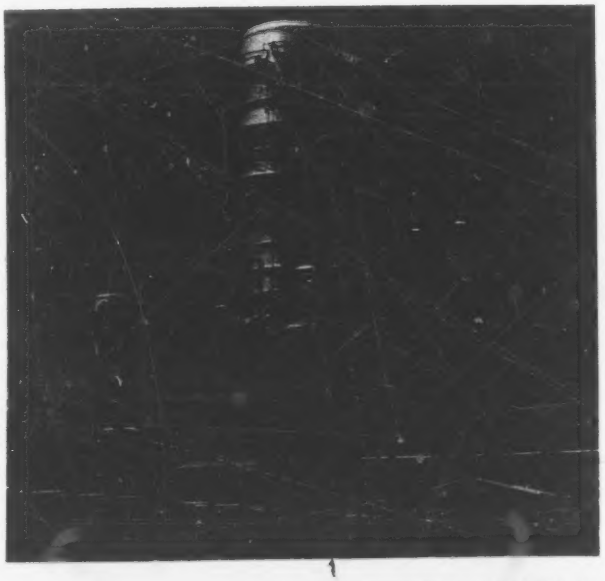
U.S.S.R./Eastern Europe ..... 46

Middle East ..... 48

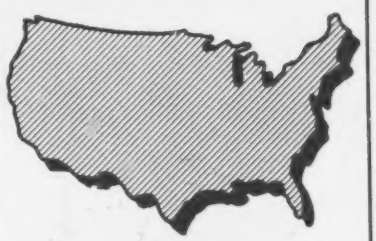
Mexico ..... 49

Brazil ..... 50



# Business expected to improve further for chemical producers



**Sparked by surging demand, rebound from 1982's deep recession has been stronger than expected this year**

**David. M. Kiefer,** C&EN Washington

It has been an upbeat year for the U.S. chemical industry, in many ways the best year since the late 1970s. And as 1983 winds down, the business expansion that chemical producers have enjoyed during the past 12 to 15 months still looks robust. Industry executives, as a result, are just about unanimous in looking for further growth during 1984.

This year's recovery comes as no great surprise, to be sure. A year ago business analysts were generally optimistic about prospects for 1983, although cautiously so. The first harbingers of recovery already were in view then. Consumer spending was on the rise. Home building was rebounding from its severely depressed level at the start of 1982, and car sales were likewise recovering. Nevertheless, the overall economy remained in a deep recession, with industrial production, overall, down about 12% from the summer of 1981. And with interest rates still high and export markets being undercut by the strength of the dollar, financial crises among the underdeveloped countries, and economic slackness elsewhere, most economists were predicting that recovery in the U.S. would be sluggish and uncertain.

What has been a surprise this year, therefore, is the strength of the recovery from the long, steep descent in chemical operations that marked 1981 and most of 1982. Production of industrial chemicals and synthetic materials (such as plastics, man-made fibers, and synthetic rubber) slumped nearly 25% during 1981 and the first half of 1982. At year's end, it was still 20% lower than it had been at the start of 1981. For 1982 as a whole, output was off 14% from the year before, with organic chemicals and man-made fibers down nearly 20%. Most industry analysts were looking for gains of no more than 5% or so for 1983 in output of basic chemicals and saw little hope that operations would be fully recovered before sometime in 1984. The rebound, they feared, would be considerably less vigorous than is typical for chemicals during the recovery phase of a business cycle.

But the recovery started early and came on strong, reflecting heavy demand from such key consumers of chemical products as the housing, home furnishings, and automobile industries. Housing starts, for example, are likely to be close to 1.7 million units this year, nearly 60% more than in 1982. And increased home building has stimulated demand for appliances, where production is up about 16% this year, and furniture, output of which is about 20% ahead of last year. With auto sales this year expected to top 1982's sales about 18%, U.S. car production will be more than 30% greater than last year, and production in the fourth quarter alone nearly 60% ahead of the like period of 1982.

Other chemical consuming industries also have been healthier. Shipments of aluminum ingot and mill products are running about 15% ahead of last year. Production of paper and paperboard probably will be up 7% for the year. Tire output is likely to be 12 to 15% higher than last year.

In addition to supplying the rising demand from such chemical customers, chemical producers also have had to build up inventories that had been depleted during the slack period of last year to keep operating costs at a minimum.

As a result, production of chemicals and synthetic materials now is about 20 to 22% higher than it was at the end of 1982 and is almost back to the same level as two years ago, just before the recession got under way. For the year as a whole, production probably will be about 14% higher than in 1982, a gain that is nearly triple what many industry officials had forecast.

The increases are widespread, as well. Output of many key petrochemicals, such as ethylene, cumene, cyclohexane, and benzene, probably will be 18 to 20% or more above last year's level. Plastics production overall probably will be 15 to 20% higher than in 1982, with polypropylene's 25 to 30% increase setting the pace among the major thermoplastics. Synthetic fibers production this year is expected to top that of 1983 15 to 18%, with nylon turning in a particularly good year among the big-volume fibers. Even some of the workhorse inorganic chemicals have made a strong comeback.

The one major outlet for chemicals that has been laggard is the farm market. The government's payment-in-kind (PIK) program and last summer's severe drought in the Midwest caused a sharp decline in this year's harvests. The PIK program alone reduced corn acreage about 28% and the total corn crop this year is expected to decline about 45%.

Cotton and soybean harvests also are well below those of 1982. Meanwhile, export markets for U.S. farm products have been weak for the second year in a row.

The result has been a decline in the amount of fertilizer and other agricultural chemicals needed by U.S. farmers. Output of farm chemicals, therefore, was lower than the year before throughout most of 1983. Although output now is beginning to move upward again as farmers increase acreage substantially during the coming year, for 1983 as a whole production of all types of agricultural chemicals may be 5 to 7% less than the previous year, with ammonia output alone off 4 to 5%.

For makers of agricultural chemicals, therefore, 1983 has been a year of lower sales volume and poor earnings. The fertilizer operations of Williams Cos., for example, had an operating loss of $13 million for the nine months ending last Sept. 30 on a 16% decline in sales revenues. For Monsanto, sales of agricultural products were down 9% for the nine-month period, and operating income for agricultural and nutritional products combined was 24% lower than in 1982.

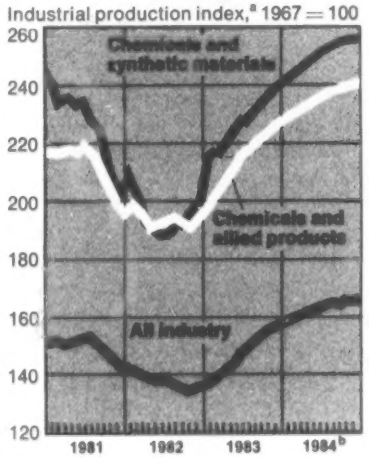
Another weak spot this year has been overseas markets. Continuing weak economic activity throughout much of the world, austerity measures on the part of many debt-plagued underdeveloped nations, and the strength of the U.S. dollar relative to major foreign currencies combined to squeeze U.S.-made chemicals out of many foreign outlets. Losses stemming from currency translation problems also remain troublesome for U.S. chemical companies with sizable business operations abroad.

But most of the other factors influencing profits were much more favorable this year than last. Firmer demand has done much to improve selling prices for chemical products, for one thing—prices that had been noticeably weak during 1982 and early 1983. For industrial chemicals, selling prices by midyear were 8% below their peak of mid-1981. Not all producers have been able to make intended price increases stick, but on the average prices now are about 4% higher than last summer and higher than at any time in more than a year and a half. Price trends are more favorable, too, for plastics and synthetic fibers.

At the same time, increased production has resulted in greatly improved rates of capacity utilization for chemical producers. Operating rates have moved above 70% for plants making major basic chemicals to the highest level in the past two years. For plastics, operating rates now are above 80%, compared to well under 70% in 1982; for synthetic fibers, the rate is pushing close to 90%, also up from less than 70% last year. Overcapacity is not a problem that has been fully solved by the chemical industry, but it's much less of a problem than it had been a few years ago.

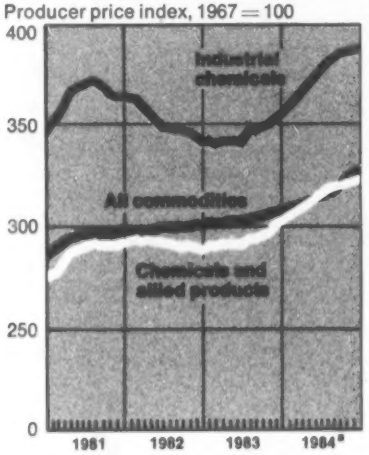
Meanwhile, the stringent measures that the industry took in the past couple of years to control costs are still largely in place. The industry, as one executive puts it, "is still operating lean and mean." Capital expenditures have been curtailed or

**Output will continue to move up next year...**



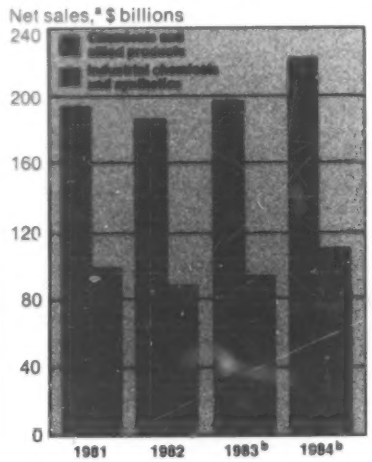

a Seasonally adjusted. b C&EN estimates.
**Source:** Federal Reserve Board

**...and selling prices will be marked up...**



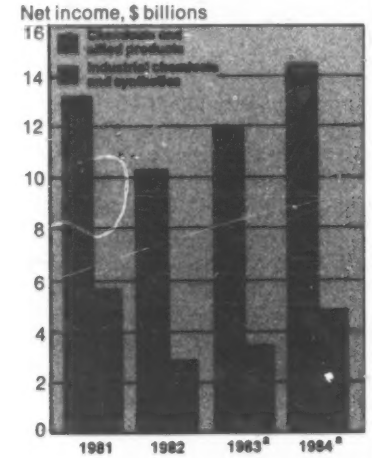

a C&EN estimates.
**Source:** Bureau of Labor Statistics

**...giving a strong boost to chemical makers' sales...**




a Excludes sales of foreign subsidiaries. b C&EN estimates. **Source:** Bureau of the Census

**...and an even bigger lift to profits**




a C&EN estimates.
**Source:** Bureau of the Census

## This year's recovery in production of most chemicals will be extended in 1984

| | 1984 | 1983 | 1982 | 1981 |
|---|---|---|---|---|
| **INORGANIC CHEMICALS** | | | | |
| Thousands of tons unless otherwise indicated | | | | |
| Ammonia | 17,000 | 14,900 | 15,500 | 19,076 |
| Chlorine gas | 11,200 | 10,300 | 9,120 | 10,767 |
| Hydrochloric acid | 3,000 | 2,800 | 2,483 | 2,502 |
| Nitric acid | 8,600 | 7,300 | 7,587 | 9,077 |
| Oxygen, billions of cu ft | 420 | 370 | 349 | 431 |
| Phosphoric acid | 10,900 | 9,950 | 8,523 | 9,922 |
| Sodium hydroxide | 11,500 | 10,600 | 9,141 | 10,414 |
| Sulfuric acid | 39,200 | 35,500 | 32,682 | 40,795 |
| **ORGANIC CHEMICALS** | | | | |
| Millions of lb unless otherwise indicated | | | | |
| Acetic acid | 2,750 | 2,500 | 2,748 | 2,705 |
| Acetone | 2,200 | 2,000 | 1,694 | 2,144 |
| Acrylonitrile | 2,250 | 2,150 | 2,035 | 1,996 |
| Benzene, millions of gal | 1,500 | 1,300 | 1,069 | 1,339 |
| Butadiene | 2,500 | 2,300 | 1,915 | 2,986 |
| Cumene | 3,550 | 3,300 | 2,743 | 3,309 |
| Cyclohexane | 1,700 | 1,550 | 1,275 | 1,820 |
| Ethylene | 32,000 | 29,000 | 24,501 | 29,418 |
| Ethylene glycol | 4,900 | 4,500 | 4,309 | 4,143 |
| Formaldehyde | 5,900 | 5,450 | 4,817 | 5,721 |
| Methanol | 8,100 | 7,400 | 7,555 | 8,577 |
| Phenol | 2,800 | 2,550 | 2,175 | 2,578 |
| Phthalic anhydride | 900 | 800 | 684 | 870 |
| Propylene | 15,600 | 14,400 | 21,535 | 13,482 |
| Styrene | 7,200 | 6,600 | 5,942 | 6,679 |
| *o*-Xylene | 900 | 800 | 802 | 918 |
| *p*-Xylene | 4,500 | 4,200 | 3,391 | 4,532 |
| **PLASTICS** | | | | |
| Millions of lb | | | | |
| Polyethylene, high density | 6,400 | 5,800 | 4,928 | 4,695 |
| Polyethylene, low density | 8,600 | 8,100 | 7,503 | 7,693 |
| Polypropylene | 5,000 | 4,500 | 3,477 | 3,955 |
| Polystyrene | 3,850 | 3,550 | 3,191 | 3,621 |
| Polyvinyl chloride | 6,850 | 6,300 | 5,326 | 5,707 |
| **SYNTHETIC FIBERS** | | | | |
| Millions of lb | | | | |
| Acrylic and modacrylic | 750 | 690 | 624 | 691 |
| Nylon | 2,600 | 2,400 | 1,927 | 2,332 |
| Olefin and vinyon | 1,000 | 900 | 723 | 785 |
| Polyester | 3,850 | 3,550 | 3,169 | 4,176 |

Sources: Bureau of the Census, International Trade Commission, Society of the Plastics Industry, Textile Economics Bureau, C&EN estimates (for 1983 and 1984)

shifted to projects designed to cut costs or improve efficiency. Spending on new plants this year will be 23% less than in 1982, which in turn had been 11% under that of 1981.

Employment rolls also have been trimmed drastically. In the overall chemicals and allied products industry, total employment is down about 50,000 workers from two years ago.

Increased demand and firmer prices have been a boon to chemical companies' financial health. Sales volume for producers of industrial chemicals and synthetics was up about 5% from last year through the first nine months of 1983 and the year-to-year comparison for the current quarter undoubtedly will be considerably more favorable. For the entire year, therefore, C&EN estimates that sales will be 7% higher than in 1982—although even so they will be about 4% lower than two years ago. For the broader chemicals and allied products industry, sales for the year are likely to rise 6% to a new all-time high.

Profits will make an even stronger comeback from the dismal slump of last year. Earnings during the final three months of the year will look particularly impressive when stacked up against the rock-bottom level of 1982's last quarter and may even be double earnings of that period. For the year as a whole, then, earnings may well be 20 to 25% ahead of last year for producers of industrial chemicals and synthetics and about 15% for chemicals and allied products.

Next year's financial results are expected to look even more glowing. Although a few maverick economists see dark clouds gathering over the national economy and talk gloomily of the threats inherent in huge federal deficits, high interest rates, and shaky international finances, the majority are essentially optimistic. As Du Pont economist Charles B. Reeder sums up the outlook, "All of the elements are present to make 1984 an unusually good year."

The consensus is that gross national product will climb 4 to 6%, after adjustment for inflation, that industrial production will be 8 to 10% higher than this year, and that unemployment will drop below 8% of the labor force by the end of the year, if not sooner.

For chemical producers, this makes a favorable climate. The housing boom is expected to level off, with new starts about the same as this year. Exports of chemicals will continue to be thwarted by the strength of the dollar. On the other hand, automobile production is pegged by Detroit for another strong gain. And the acreage planted by farmers will expand substantially, providing sharply increased demand for fertilizer and pesticides.

C&EN estimates, consequently, that production of chemicals and synthetic materials next year will be up 11%, with the sharpest gains coming during the first half of the year. For all chemicals and allied products, the increase will be only a slightly more modest 10%. Prices will continue to rise, with the year as a whole averaging about 8 to 10% higher for industrial chemicals. That means a further increase, too, for sales volume, perhaps as much as 14 to 16%, for producers of industrial chemicals and synthetics. And profits, in turn, can be expected to surge 30 to 35%, if not more. Even so, the industry's profits will not match those of 1981. □

**Although world trade in chemicals is higher, the U.S. share of the world market will shrink this year**

**Earl V. Anderson,** C&EN New York

# U.S. surplus in chemical trade narrows again as exports drop

All is not right with world chemical trade. But at least it is better than it was a year ago.

Better, that is, for most of the major chemical trading nations, but certainly not for the U.S. Although total world trade in chemical products will increase this year, U.S. chemical exports will drop for the second year in a row. This means that the U.S. share of world chemical markets also will decline for the first time in the past five years. And coupled with a sizable increase in U.S. chemical imports, the decline in imports also means that the U.S. chemical trade surplus will take another beating.

There is very little that chemical industry executives can do about the decline, except to try harder. Many of the factors that are lined up against U.S. chemical exports and in favor of chemical imports are the same factors that are hurting U.S. exports and encouraging the growth of U.S. imports in general. They are beyond the control of the chemical companies.

The strong dollar, a solid economic recovery in the U.S., a much slower-paced recovery abroad, and overwhelming debt problems in many of the developing countries that are strong markets for U.S. exports are just a few of the factors that are raising havoc with the U.S. trade balance.

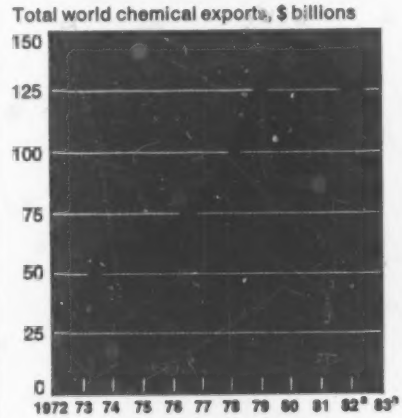
Of them all, the strong U.S. dollar has received the most attention, if not corrective action. A strong dollar hurts exports by making them more expensive overseas and thus less competitive against foreign-made products. The dollar, says Robert Lawrence, a senior fellow at Brookings Institution in Washington, D.C., is pricing U.S. companies out of the international market. It also sucks more imports into the U.S. because they become less expensive.

The dollar is widely considered to be overvalued against many foreign currencies. On a trade-weighted basis, it has appreciated 50% since early 1980. Since late 1978, it has risen more than a third against the Japanese yen, while inflation in the U.S. was running at least 20% greater than in Japan. This has produced a "stunning" deterioration of more than 50% in U.S. price competitiveness against its major rival in international trade, says C. Fred Bergsten, director of the Institute for International Economics.

And, adds Bergsten, the current overpricing of the dollar has the same effect as placing a 20 to 25% tax on all U.S. exports and paying a similar subsidy on all U.S. imports. Eliminating this price disadvantage, he says, will do more to revitalize the international competitiveness of U.S.

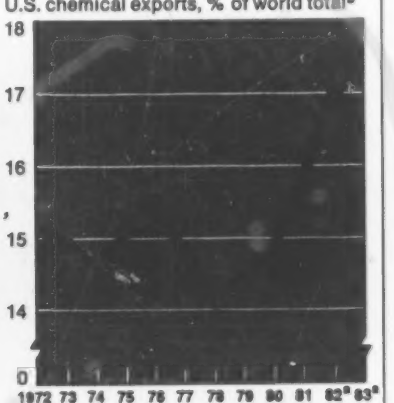
**World trade in chemicals rebounds a little this year . . .**

Total world chemical exports, $ billions




**. . . but U.S. share is a bit lower**

U.S. chemical exports, % of world total[b]



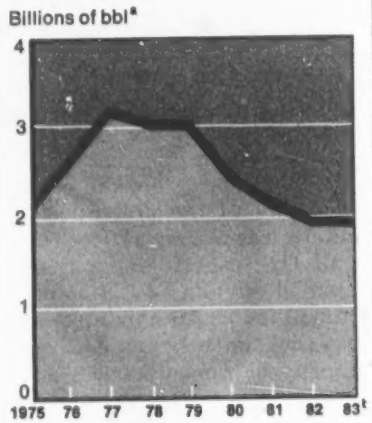

a C&EN estimates. b Defined as: U.S. chemical exports as per cent of world chemical exports less U.S. chemical imports. **Sources:** United Nations, Bureau of the Census

## Drop in chemical exports is widespread; organic chemicals, plastics pace import growth

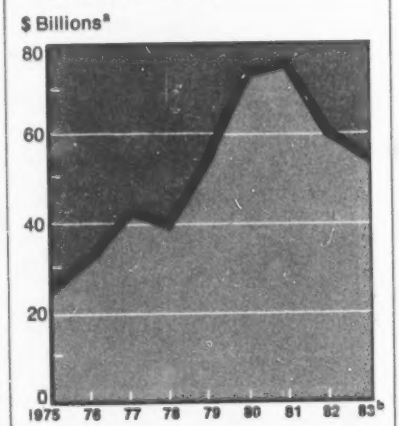
| $ Millions | U.S. chemical exports | | | | U.S. chemical imports | | | |
|---|---|---|---|---|---|---|---|---|
| | 1983[a] | 1982 | 1981 | 1980 | 1983[a] | 1982 | 1981 | 1980 |
| Organic chemicals | $ 5,134 | $ 5,440 | $ 5,929 | $ 5,697 | $ 3,459 | $2960 | $2974 | $2541 |
| Plastics and resins | 3,680 | 3,650 | 3,809 | 3,884 | 1,030 | 766 | 780 | 647 |
| Medicinals and pharmaceuticals | 2,438 | 2,275 | 2,165 | 1,932 | 705 | 563 | 583 | 509 |
| Inorganic chemicals | 1,782 | 1,969 | 2,286 | 2,106 | 1,562 | 1502 | 1573 | 1324 |
| Radioactive materials | 1,312 | 1,132 | 988 | 833 | 921 | 1143 | 786 | 990 |
| Fertilizers, manufactured | 1,276 | 1,386 | 1,735 | 2,265 | 984 | 963 | 1181 | 1105 |
| Pesticides and disinfectants | 613 | 607 | 544 | 553 | 262 | 265 | 283 | 264 |
| Flavors, perfumes, cosmetics, and toiletries | 478 | 514 | 535 | 479 | 375 | 295 | 289 | 302 |
| Pigments, paints, and varnishes | 322 | 332 | 349 | 304 | 140 | 103 | 102 | 89 |
| Cleaning and polishing materials | 296 | 324 | 396 | 327 | 91 | 76 | 74 | 72 |
| Dyeing, coloring, and tanning materials | 163 | 162 | 175 | 186 | 296 | 213 | 226 | 195 |
| Explosives and pyrotechnics | 86 | 90 | 90 | 87 | 68 | 67 | 61 | 59 |
| Miscellaneous | 1,920 | 2,010 | 2,187 | 2,087 | 757 | 579 | 534 | 497 |
| **TOTAL** | **$19,500** | **$19,891** | **$21,187** | **$20,740** | **$10,650** | **$9494** | **$9446** | **$8594** |

a C&EN estimates. Source: Bureau of the Census

### Volume of U.S. oil imports remains at low level...




### ...but their cost declines further




a All petroleum products. b C&EN estimate. Source: Bureau of the Census

companies than concocting an industrial policy, which is the new buzz word in Washington.

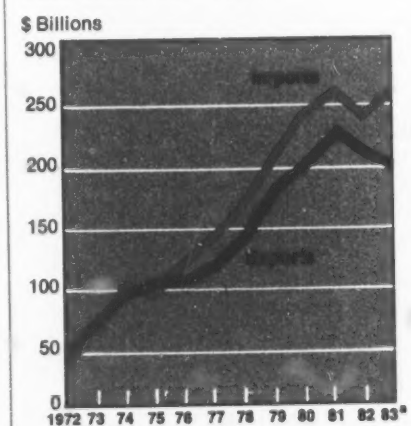
The present value of the dollar is as high as it is because of the large U.S. budget deficits, most economists agree. Huge deficits, by pushing up interest rates, lure foreign currency into U.S. financial markets. This increases demand for dollars which, in turn, pushes up foreign exchange rates.

Whatever the reason, the strong dollar is helping to send the U.S. trade deficit into orbit. This year, the deficit will leap to $55 billion, a whopping 72% higher than it was last year and a new record for U.S. trade deficits, although a record that no doubt will be broken again next year. You have to go back to 1975 to find the last time the U.S. had a trade surplus.

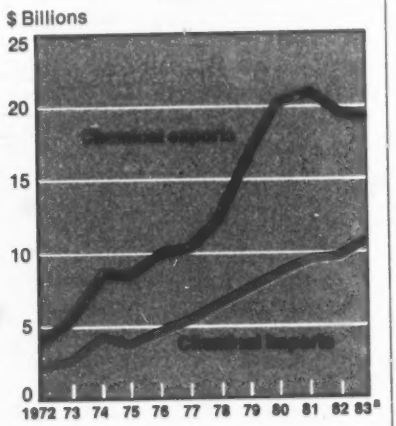
Given the strength of the economic recovery in the U.S., this year's increase in imports seems modest—about 4.5% to $255 billion. But the bill for imported oil is down sharply this year, from $60.5 billion in 1982 to $53 billion. That means that imports of other products increased more than the total import figure indicates. Indeed, most categories of imports are higher this year than last, especially machine and transport equipment.

Exports, meanwhile, have not

### Overall U.S. trade deficit continues to widen...




### ...while the chemical trade surplus shrinks slightly




a C&EN estimates. Source: Bureau of the Census

benefited from the lukewarm recovery abroad. U.S. exports this year will be down about 6% to $200 billion, with all product areas, even agricultural products, sharing the decline.

Chemical exports are no exception. This year's decrease isn't so bad as that of last year, when chemical exports fell 6%. Nevertheless, chemical exports probably will total about $19.5 billion for 1983, 2% lower than last year.

Chemical imports, however, will reach a milestone of sorts by topping $10 billion for the first time in 1983. Best estimates are that they will reach $10.7 billion, a hefty 12% improvement over last year.

With very few exceptions, the U.S. chemical industry traditionally has chalked up surpluses in its foreign trade. In 1980, the trade surplus climbed to a record $12.1 billion. But it has shrunk more than 25% in the past three years and this year will be down to only $8.9 billion.

This erosion of the chemical industry's cherished trade surplus is creating more than a little concern among industry trade experts. And it helps explain why more industry spokesmen and position papers are getting an airing at government hearings, especially in Congress, on matters related to U.S. trade with the rest of the world.

One example of proposed legislation stemming from this concern is the Trade Remedies Reform Act of 1983 (the Gibbons Bill). This bill would reform antidumping and countervailing duty laws and probably provide sanctions against both preferential pricing of natural resources by other countries and industrial targeting.

This and other proposed legislation, such as the domestic content bill, are aimed at disruptive imports. They do nothing to help exports.

The biggest obstacles impeding U.S. chemical export growth, in addition to the strong dollar, are the slow-to-recover economies in many other industrialized countries and the massive external debt problems in many developing nations. Among developed countries, only chemical exports from the U.S. to Canada will show any sizable gain this year.

That's not surprising because Canada's economy is tied so closely to that of its southern neighbor that when the U.S. economy perks up, Canada's also perks up. As a result, U.S. chemical exports to Canada will increase almost 15% this year to $2.5 billion.

That kind of growth certainly won't be visible for chemical shipments to Western Europe or Japan this year. And sales to most developing areas are either stagnant or down.

This is especially true of Latin America, the largest market for U.S. chemicals in the developing world and the second largest target anywhere after Western Europe. When chemical exports to Latin America drop a painful 11%, as they will this year, the impact on the operations of U.S. chemical companies will be severe.

Next year could see some improvement in U.S. chemical exports. Economic recovery probably will be more entrenched in Europe and in Japan. With help from the international banking community, debt-ridden developing countries may be in a better position to ease up on import restrictions. And some economists believe that the value of the dollar will decline relative to other currencies.

However, others fear the adverse effects of a strong dollar will continue, and may even get worse in the year ahead. □

## Lower demand in Latin America hurts U.S. chemical exports

| $ Millions | 1983[a] | 1982 |
|---|---|---|
| **U.S. CHEMICAL EXPORTS** | | |
| Canada | $ 2,509 | $ 2,183 |
| Latin America | 3,284 | 3,670 |
| Western Europe | 6,027 | 5,940 |
| Eastern Europe | 265 | 366 |
| Japan | 2,476 | 2,530 |
| Communist Asia | 344 | 497 |
| Middle East | 447 | 533 |
| Rest of Asia | 2,688 | 2,600 |
| Australasia | 691 | 655 |
| Africa | 465 | 524 |
| Other | 304 | 393 |
| TOTAL | $19,500 | $19,891 |
| **U.S. CHEMICAL IMPORTS** | | |
| Canada | $ 2,353 | $ 2,596 |
| Latin America | 963 | 613 |
| Western Europe | 4,940 | 4,174 |
| Eastern Europe | 190 | 151 |
| Japan | 1,085 | 879 |
| Communist Asia | 127 | 136 |
| Middle East | 124 | 99 |
| Rest of Asia | 266 | 220 |
| Australasia | 228 | 286 |
| Africa | 214 | 225 |
| Other | 160 | 115 |
| TOTAL | $10,650 | $ 9,494 |

a C&EN estimates. Source: Bureau of the Census

## Exports slump across the board but imports are higher for nearly everything except fuels

| $ Billions | U.S. exports | | | | U.S. imports | | | |
|---|---|---|---|---|---|---|---|---|
| | 1983[a] | 1982 | 1981 | 1980 | 1983[a] | 1982 | 1981 | 1980 |
| Chemicals | $ 19.5 | $ 19.9 | $ 21.2 | $ 20.7 | $ 10.7 | $ 9.5 | $ 9.4 | $ 8.6 |
| Machinery and transportation equipment | 82.5 | 87.1 | 95.7 | 84.6 | 84.1 | 73.3 | 69.7 | 60.5 |
| Other manufactured goods | 30.2 | 33.0 | 37.3 | 38.6 | 66.2 | 61.1 | 63.4 | 55.9 |
| Food and live animals | 23.5 | 24.0 | 30.3 | 27.7 | 15.7 | 14.5 | 15.2 | 15.8 |
| Beverages and tobacco | 2.7 | 3.0 | 2.9 | 2.7 | 3.4 | 3.4 | 3.1 | 2.8 |
| Mineral fuels, lubricants, and related materials | 10.1 | 12.7 | 10.3 | 8.0 | 57.2 | 65.4 | 81.4 | 79.0 |
| Crude materials (inedible) other than fuels | 18.5 | 19.2 | 21.0 | 23.8 | 9.3 | 8.6 | 11.0 | 10.5 |
| Animal and vegetable oils and fats | 1.3 | 1.5 | 1.7 | 1.9 | 0.4 | 0.4 | 0.5 | 0.5 |
| Miscellaneous products | 7.1 | 6.9 | 8.4 | 8.4 | 8.0 | 7.7 | 7.3 | 7.2 |
| TOTAL[b] | $200.0[b] | $212.2[b] | $233.7[b] | $200.6[b] | $255.0 | $244.0 | $261.0 | $240.8 |

a C&EN estimates. b Includes re-exported imports (not included in individual product categories). Source: Bureau of the Census

# Recovery is under way but overcapacity remains a problem

**Though many plants already have been shut down, chemical officials see need for still further cutbacks in capacity**

**Dermot A. O'Sullivan,** C&EN London

Chemical companies in Western Europe have come through 1983 in reasonably good shape. Demand gained momentum as the year progressed. Corporate results appear positively bullish when set against 1982.

One helping factor is that the usual midsummer lull didn't materialize. BASF chairman Hans Albers sums up the position by saying, "This spring, the economic climate was often described in these words: 'The mood is better than the situation.' Today, I can say, 'The situation is at least as good as the mood.' "

The improvement shows through in the financial results of major chemical companies. For the nine months ending with September, in contrast to a year earlier, Akzo's sales were up 4%, BASF's 6%, Bayer's 5%, Hoechst's 4%, and Imperial Chemical Industries' 12%.

More significant was the across-the-board surge in pretax profits—Akzo 153%, BASF 57%, Bayer 77%, Hoechst 87%, and Imperial Chemical Industries (ICI) 119%. Contributing in large measure to the upswing were the emergency actions that all these companies initiated in the past two years. Plant closures, restructuring, layoffs, and the like helped boost plant utilization and partly offset the rise in operating expenses stemming from higher energy and feedstock costs. Moreover, companies have upped selling prices successfully throughout the year.

Although no one knocks these healthier figures, managers continue to complain that profit margins for many products remain squeezed. Ironically, too, the improvement in corporate balance sheets has prompted an element of concern. Comments David Oxley of Chem Systems' London office, "Renewal of business confidence there may be. But there is a worry that this confidence may be a bit too euphoric. People may decide to build another plant, or not to close down one they were thinking of shutting."

Adds Thomas O. Hutchison, ICI's petrochemicals and plastics division chairman, "Though we are in the black, we are not anything at a reasonable level of profitability. I hope the industry does not become complacent as trade improves." His division, in the red since 1979, finally managed to break even in this year's third quarter. This, as Hutchison bluntly puts it, "was one hell of an achievement."

In much the same vein, Gaston Beauregard, head of planning at Shell International Chemical's petrochemicals division, stresses "the continuing need for rationalization. Everybody should be looking at it because everybody can do something. We are enjoying a bit of a breather, but we are not through the woods yet." During this year's first nine months, Shell's worldwide chemical operations (excluding Canada and the U.S.) earned about $47 million, its first profit since 1979. "But it's still peanuts considering the amount we have invested in chemicals," Beauregard remarks.

The recent improvement in the financial returns of European chemical companies has been influenced largely by the upturn in the U.S. economy and the continued strengthening of the U.S. dollar against European currencies. Rising U.S. demand has tended to suck materials in from Europe. Moreover, goods priced in dollars have become much more expensive in European currency terms. Conversely, European-made chemicals and derivatives are more competitive in world markets against products priced in dollars.

Within Europe itself, demand is being influenced by stockbuilding in advance of rising prices. Although there has been some increase in consumer spending on such items as automobiles, household goods, and the like, all of which need chemicals in their production, this has been outpaced by the filling of inventory pipelines.

These influences can be seen in this year's sales pattern of commodity plastics. In the case of low-density polyethylene, for example, West European production is 15% ahead of 1982. European sales are up about 10%, but exports have advanced 30%. Likewise for polypropylene, the 10% or so increase in European sales is dwarfed by a 40% rise in exports. Polyvinyl chloride has followed much the same pattern. Production is up 8%, local sales are up about 4%, but exports are up 40%.

According to Chem Systems, European low-density polyethylene and polypropylene plants currently are running at about 90% of their effective capacities and polyvinyl chloride plants at between 70 and 80%, rates which are well ahead of last year.

Higher utilization rates undoubtedly also reflect rationalization steps that producers embarked on when the slump in sales and profits began to bite. Senior management of all the major European chemical producers profess themselves to be committed to continuing the process. Nevertheless, some of the edge appears to have come off the drive. As Robert B. Horton, managing director of BP Chemicals International, noted at the European Petrochemical Association conference in Monte Carlo this fall, "After a good start in 1982, this year has seen more and more talk about the subject and less and less action."

Citing ethylene crackers as an example, Horton notes that West European nameplate capacity currently stands at 32 billion lb, 9.5% below the level at the close of 1980. U.K. capacity has been cut 30% (1.3 billion lb), although most of that will be restored when the Esso/Shell cracker going in at Mossmorran, Scotland, comes on stream in 1985 with its 1.1 billion lb-a-year capacity. Next in terms of cuts in ethylene capacity are West Germany (21%, 2.2 billion lb), Belgium/Netherlands (14%, 1.0 billion lb), and France (3%, 200 million lb). In Italy, capacity actually increased 25% to 3.9 billion lb, and throughout the rest of Western Europe capacity rose 12% to 5.4 billion lb.

Despite the overall decline, ethylene capacity still is well ahead of the 25.3 billion lb-a-year demand level. Horton reasons that when the Mossmorran unit comes on stream, 3.5 billion lb of ethylene-making capacity will have to be closed permanently in Western Europe to allow remaining units to operate at 85% or so of their design levels.

Shell International Chemical's Beauregard likens rationalization to drying a wet towel. "The first twist produces a lot of water. But as you keep turning it, it's very hard to get it completely dry. Closures were at sites with more than one cracker. There wasn't the pain of closing the last one. Now we are coming to candidates for closure where it is much tougher to make a decision."

West European growth prospects for commodity plastics, the main outlet for cracker-derived olefins, appear limited. Between 1983 and 1987, according to Falk von Tettenborn, Hoechst's director of plastics marketing, consumption of high- and low-density polyethylene, polypropylene, polystyrene, and polyvinyl chloride in Europe is likely to grow a marginal 1.4% a year to 27.9 billion lb.

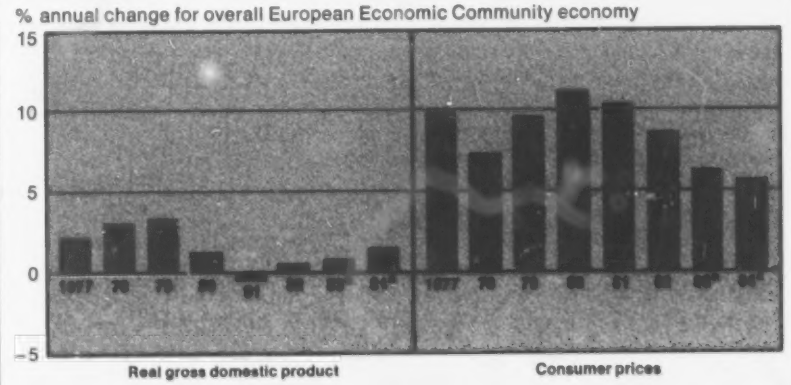
For polystyrene, he foresees an average annual growth in consumption of 1.4% to 2.8 billion lb. He expects high-density polyethylene and polyvinyl chloride to grow about 1.7% a year to 3.6 billion lb and 8.8 billion lb, respectively, whereas use of low-density polyethylene will decline 0.3% a year to 8.6 billion lb. Polypropylene holds the only promise of reasonable growth, which von Tettenborn pegs at better than 4% annually to 4.1 billion lb.

Such tempered projections contrast with these polymers' lively performance this year. Von Tettenborn notes that the 26.4 billion lb of commodity plastics consumed throughout Western Europe is ahead 6% from 1981. The biggest gains were made by polypropylene (9% to 3.5 billion lb), LDPE (9% to 8.7 billion lb), and HDPE (8% to 3.4 billion lb). PVC consumption moved forward 4% to 8.2 billion lb. Polystyrene's growth was a weak 1% to 2.6 billion lb.

Reflecting the criticism of the industry voiced by BP Chemicals' Bob Horton, Simon D. de Bree, vice president of DSM's plastics division, deplores the fact that the economic upturn has induced several producers in Western Europe to postpone closure of production facilities. "So long as the existing overcapacities are

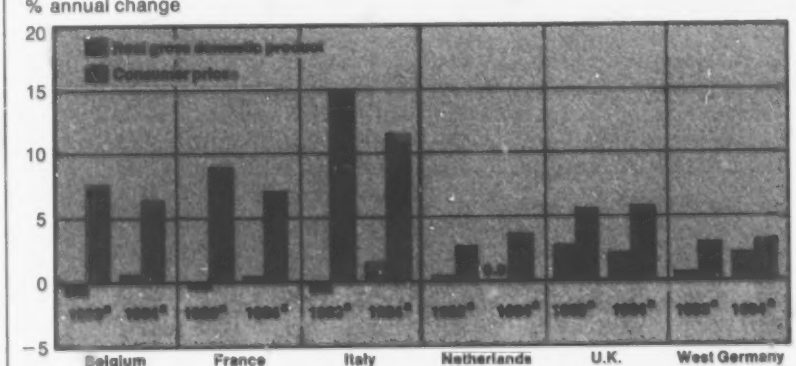
**Economic growth is slow but inflation is easing...**

% annual change for overall European Economic Community economy




**...at least in countries where it has been highest**

% annual change




a Estimated. **Source:** Commission of the European Communities

not further reduced," he warns, "there will be no question of structural recovery in this branch of industry. Additional closures are definitely required."

European producers of synthetic fibers have taken rationalization to heart, and their moves appear to be paying off. "The situation now has improved substantially," remarks Jean-Louis Juvet, director general of the Paris-based International Rayon & Synthetic Fibers Committee (CIRFS). "Today's structure of the industry is more in line with potential sales. Surplus capacities have been largely reduced. Through better utilization of capacities, most companies' fibers operations should be in the black this year."

Overall, some 1.1 billion lb (about 17%) of fiber-making capacity has been taken out of service during the past two years under a scheme drawn up under CIRFS' guidance. The decrease follows earlier cuts of about 880 million lb. The view at Hoechst, nevertheless, is that even though "the industry in Western Europe seems to have recovered after a three-year period of stagnation, and demand for textile fibers is lively, the basic problem of overcapacity is not yet satisfactorily solved."

In absolute terms, sales of about 1.3 billion lb of polyamide and 1.7 billion lb of polyester fibers in Western Europe this year will be about level with last year, with sales of acrylics up about 10% to 1.6 billion lb. Despite no growth in polyamides and polyesters, companies in the business are showing better financial returns.

Akzo of the Netherlands, long plagued by its fibers business worldwide, registered operating income from fibers at the end of this year's first nine months of $30.5 million, in contrast to the $334,000 loss the previous year calculated on the same currency exchange basis. "The rate of utilization of Enka Europe plants was satisfactory," company management observes, although "selling price levels, notably for textile and carpet fibers, were still too low, thus limiting the improvement."

Better returns on fibers, yarns, and fabrics led to London-based Courtaulds' 169% surge in pretax profit on these items to $54.8 million in the first six months of its business year, through September. For ICI, which has lost money on fibers each year since 1974, "fibers still have not emerged into profit, but losses are at a reduced level compared to 1982." With marketing conditions still difficult and the European market remaining flat, higher levels of exports to the U.S. compensated to some extent, a company spokesman notes. ICI decided two years ago to move away from commodity synthetic fibers, concentrating instead on high-quality specialties aimed at the upper end of the market.

Monsanto dropped entirely out of fibers production in Europe with the sale this year of its acrylic fiber operations in Coleraine, Northern Ireland, and at Lingen, West Germany. Montefibre, the fibers arm of Italy's Montedison, now runs the 66 million lb-a-year Coleraine plant and Bayer owns the 79 million lb-a-year Lingen facility.

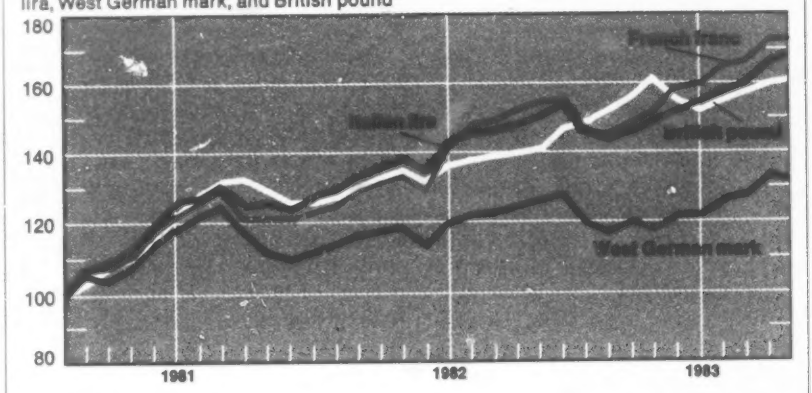
CIRFS' Juvet observes that imports from the U.S., once a thorn in the side of Western Europe's fiber producers, "have all but disappeared [owing] to the dollar's present exchange rate." He is concerned, however, that "when people here start making money again, outsiders might come in." He also believes that "we might have problems with Turkey, where acrylic fiber capacity is going up."

Observers may score European chemical companies for not rationalizing operations to the extent that should be done. But they can hardly criticize the companies for not taking steps to restructure, regroup, and consolidate. Moves along these lines have been widespread this past year. Some examples:

- Exxon reached agreement with the Greek government to sell its 3.5 million ton-a-year oil refinery and associated petrochemical complex at Thessalonica. Chemical operations include a naphtha cracker with an annual ethylene output capability of 110 million lb. Other products are ammonia, chlorine, polyvinyl chloride, fertilizers, and solvents.
- ICI, already big in fertilizers and plant chemicals, acquired the fertilizer and agrichemicals business of Albright & Wilson, the wholly owned U.K. subsidiary of Tenneco. Included are plants for making ammonium nitrate, compound fertilizers, and a range of pesticides. The move follows this year's acquisition of Hargreaves Fertiliser Industries, also in the U.K.
- Monsanto became sole owner of Polyamide Intermediates through its

**Dollar continues to strengthen versus European currencies**

Relative value of U.S. dollar vs. French franc, Italian lira, West German mark, and British pound[a]




[a] January 1981 = 100.

Reprints of this C&EN special report will be available at $3.00 per copy. For 10 or more copies, $1.75 per copy. Send requests to: Distribution Room 210, American Chemical Society, 1155—16th St., N.W., Washington, D.C. 20036. On orders of $20 or less, please send check or money order with request.

purchase of Montedison's half-interest. Set up in 1974, the company has units at Seal Sands, on England's east coast, for making 198 million lb a year each of adiponitrile and hexamethylene diamine, intermediates for nylon production. Monsanto ships most of the output to its U.S. operations.

• Norsk Hydro of Norway strengthened its position in polyvinyl chloride by buying two plants in the U.K. with combined annual capacity of 330 million lb. This month, it agreed to acquire Kemanobel's 242 million lb-a-year polyvinyl chloride operations in Sweden. Included are plants for making caustic, chlorine, and vinyl chloride.

But it is France and Italy where the most sweeping changes in chemical company structures are taking place. Corporate realignments, which got under way in earnest last year, continued throughout this current year.

The moves in France are a continuation of plans drawn up by the Socialist government under president François Mitterand soon after the national election two years ago. The objective is to reshape and revitalize all sectors of the chemical industry—fertilizers, fibers, commodity products, petrochemicals, and pharmaceuticals—to streamline what had been an extremely complex infrastructure of interlinked company affiliates and subsidiaries.

Not surprisingly, the task has encountered difficulties. Top executives—including the heads of Société Nationale Elf Aquitaine and of Rhône-Poulenc—have quit or been fired because of disagreement with government policies. Much yet remains to be accomplished. But there are clear signs of progress. The principal companies involved are CdF Chimie, Compagnie Française des Pétroles (Total), Elf Aquitaine, Rhône-Poulenc, and Produits Chimiques Ugine-Kuhlmann (PCUK), defunct subsidiary of the international metals and mining giant, Pêchiney-Ugine-Kuhlmann.

Rhône-Poulenc now drops to second place among French chemical concerns after Elf Aquitaine. Elf, which already had extensive chemical interests in addition to its oil activities, will take on the bulk of PCUK's operations. It also assumes full ownership of Ato Chimie (organic chemicals, petrochemicals, and plastics) and Chloé Chimie (inorganic and organic chemicals and polyvinyl chloride), which it had owned jointly with Total. Ato and Chloé have been merged into a single subsidiary, Atochem, that also combines parts of PCUK.

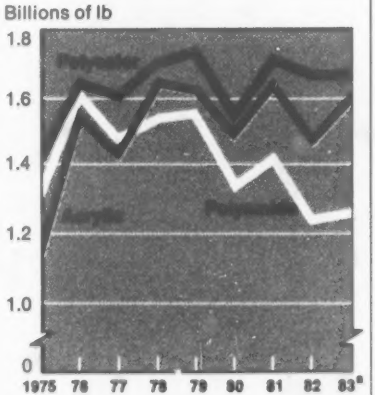
Rhône-Poulenc will attempt to fight its way back to profitability through greater emphasis on higher value-added specialties. It takes on PCUK's fine and inorganic chemicals, as well as Pharmuka, PCUK's pharmaceuticals company.

CdF Chimie, France's major fertilizer concern, is involved heavily with petrochemicals, plastics, and surface coatings. It receives the unsaturated polyester resins activities of the former Chloé and the remaining slice of PCUK that includes plastics and printing inks.

The chemical companies of France have been losing money heavily for several years and they hope the harmonization plans ultimately will reverse the trend. But the process will take some time. Meanwhile, the government is committed to injecting large sums of money, and it expects the companies themselves to initiate streamlinings that inevitably will entail cutting staffs.

This year, too, the Italians went far toward sorting out their chemical industry. Central to the operation, which has government backing, are Ente Nazionale Idrocarburi (ENI), the state-owned energy and hydrocarbons concern, and Montedison. The task was made all the more difficult by the several thousand workers involved, many hundreds of whom can't be kept on in the new structure.

**Fiber production lags levels of late 1970s**




a Estimates. **Source:** CIRFS (International Rayon & Synthetic Fibers Committee)

EniChem, ENI's new chemicals arm, has emerged as Italy's leading chemical company. It has taken over activities formerly run by ANIC, Liquichimica, Rumianca, and Societa Italiana Resine, together with a large slice of Montedison. The company also assumed whole ownership of Enoxy Chemical when Occidental Petroleum pulled out of the joint venture with ENI late last year.

The eight areas EniChem is engaged in are agricultural chemicals, basic chemicals, fine chemicals, detergent intermediates, pharmaceuticals, plastics and engineering polymers, synthetic fibers, and synthetic rubbers.

In petrochemicals, the company is responsible for all of Italy's lower olefins apart from one cracker Montedison has retained. This gives EniChem a nameplate ethylene capacity of about 2.2 billion lb. Products include elastomers and polyethylene, together with the necessary intermediates.

Although committed to improving efficiencies and maintaining production of bulk chemicals, there will be a push into the more profitable specialty areas. "Our objectives are to bring EniChem to net profitability by 1985," says vice president and general manager Italo Trapasso.

Speaking at the European Chemical Marketing Research Association's annual conference in Venice recently, Trapasso noted that in the past 12 months EniChem has closed or stopped construction of partially completed plants that could produce 2 billion lb of ethylene and 1.3 billion lb of plastics, mainly polyethylene and polyvinyl chloride, as well as several million pounds of other petrochemical products. These include acrylonitrile, aromatics, polyester staple fiber, and elastomers.

Italy's process of building a new, stronger petrochemical industry represents, in Trapasso's view, "one of the greatest reorganization challenges ever faced by the European

chemical industry." He notes that since 1980, 49% of the country's ethylene capacity, 42% of low-density polyethylene, 29% of polyvinyl chloride, and 25% of high-density polyethylene capacity have been shut down.

Montedison management has been working assiduously to restructure in a drive to lift the company out of the red that it has been in for a number of years. Perhaps the most significant event this year is its linkup with Hercules, both in polypropylene and in health care products.

Polypropylene will be marketed worldwide through Himont, in which each partner has an equal stake. The marriage will benefit from Montedison's technical know-how in making the polymer using a third-generation catalyst developed jointly with Mitsui Petrochemical of Japan. The new Ziegler-Natta catalyst can slice 20% or more off production costs. Hercules' major contribution to the joint venture is its global marketing network.

Both companies have pooled their manufacturing facilities, totaling 2.5 billion lb annually, making Himont the world's biggest polypropylene company. Himont also will absorb Neofil, the Italian-based Hercules/Montedison joint venture that manufactures polypropylene filament for carpets.

In the health care sector, Montedison has formed a new company, Erbamont, that consolidates its already considerable activities in pharmaceuticals. Erbamont has taken full title to Adria Laboratories, a Columbus, Ohio-based pharmaceutical company that Montedison had owned jointly with Hercules. In return, Hercules has a participation in Erbamont.

Also coming within the Erbamont fold are Kallestad Laboratories, which is headquartered in Austin, Tex., and active in the rapidly growing immuno diagnostics field, that Montedison acquired in July, and Lark Laboratories of New York City, a producer of bulk pharmaceutical products. Montedison sees these acquisitions as fundamental moves toward its becoming a primary factor in international pharmaceuticals markets.

While European chemical companies strive to improve their profitability, they are doing so against the background of a shaky economic climate. In its current annual economic report, the Commission of the European Communities plainly states that "the recovery remains slow and fragile in all respects. Some cyclical recovery in Europe is apparent, but it is patchy and on the whole weak, and is potentially vulnerable to any new adverse shocks from the international economy.

"There is now a communitywide effort to bring trends in public finance and wage costs under control. But the transformation of the adjustment process into the next dynamic phase of recovery is not yet evident on a wide or deep scale. In the Commission's judgment, the risks of relapse into continued quasi-stagnation are too great to let policies stand on the status quo."

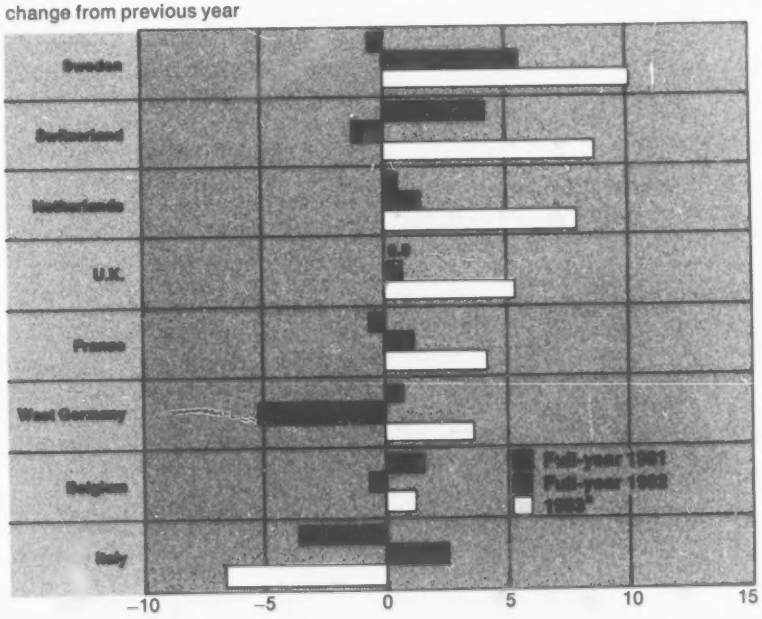
Gross domestic product for the European Community grew a mere 0.5% this year. The increase was about the same as for 1982, and only half of what was forecast a year ago. For 1984, the commission looks for a 1.5% rise, but this might be optimistic. There are, of course, differences among the 10 member countries. The U.K. (up 2.8% this year) and Denmark (up 2.2%) fared best, whereas Luxembourg had a 2.4% fall in gross domestic product.

Inflation is lower for the fourth straight year. At 6.3%, it is well below the 11.1% high of 1980. Tough economic measures in West Germany and the Netherlands held it to around 3% there. In Italy, however, it is 15% this year and in Greece it tops 20%.

Unemployment continues to be a problem throughout EC. This year, the average edged beyond 10% of the working population for the first time, and unemployment may reach 11% in 1984. Ireland and the Netherlands have unemployment levels greater than 15%. Belgium isn't far behind at 14.5%.

In addition to coping with the uncertainties of a fragile Europe-wide economic situation, chemical company managers have another nagging concern. The time is fast approaching when they will face severe competition from Canada and the Middle East, both in Europe and in the areas elsewhere throughout the world to which they export. □

**Chemical output on the upswing in most of Western Europe**




a 1983 data are for first nine months for Switzerland, U.K., and Italy, for first eight months for Netherlands, France, and West Germany, and for first six months for Sweden and Belgium. **Source:** National chemical federations for each country

**Petrochemicals makers plan to cut excess capacity and form joint sales companies to avoid price wars**

**Earl V. Anderson,** C&EN New York

Japan

# Chemical producers put hopes for revival on restructuring

Japan's chemical industry is crawling painfully out of the hole that it was pushed into by the country's lingering recession and the industry's own structural problems. Although this progress pleases chemical company executives, they aren't necessarily overjoyed.

Japan's economic recovery, which trails that in the U.S. by several months, has been relatively mild and is just starting to show signs of vigor. And the chemical industry, particularly in petrochemicals, has just begun a restructuring program that could take five years to complete.

The legal vehicle for restructuring is the Temporary Measures Law for Structural Adjustment of Specific Industries—commonly called the industrial structure law. It became effective in May, after a heated battle between the powerful Ministry of International Trade & Industry (MITI) and the Fair Trade Commission.

This new law replaces an older Specific Depressed Industries Law that expired in June. The old law was designed to see several depressed Japanese industries through troubles triggered by the first oil crisis 10 years ago. The idea was that these industries would be back on their feet by the time the law expired.

The second Iranian oil crisis disrupted this schedule. Not only did some industries covered under the old law fail to recover, but several others were added to the list of Japan's depressed industries, including petrochemicals, synthetic fibers, and fertilizers. And petrochemicals probably get the nod as the focal point of the new industrial structure law.

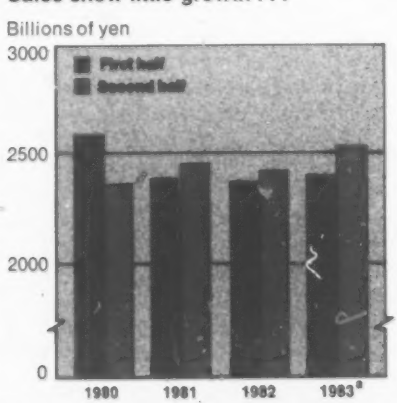
The new law makes it possible for companies within a specified industry to scrap excess capacity on a joint basis. They also are allowed to establish joint sales companies to avoid damaging price wars that result from too many companies chasing too small a market. These actions ordinarily would be illegal under Japan's Antimonopoly Act.

Petrochemical companies are adopting these two tactics enthusiastically. Plans are under way to cut ethylene capacity 36%, polyolefins capacity 22%, and polyvinyl chloride (PVC) capacity 24%. Joint sales arrangements are being established for various polyolefins and for PVC.

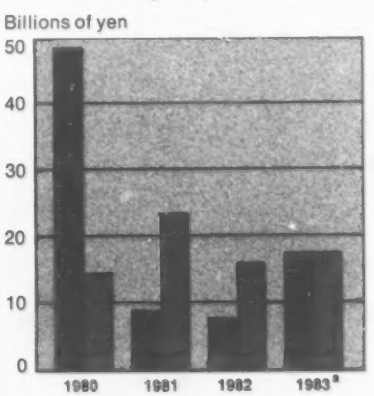
Ethylene and polyolefin plant-

**Recovery remains elusive for Japan's petrochemical producers**

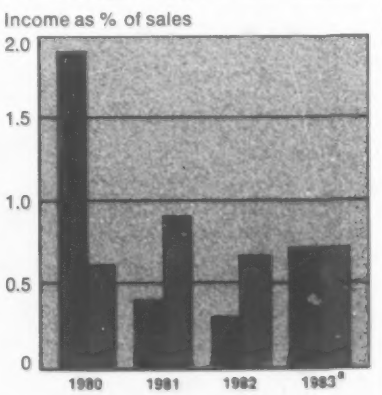
**Sales show little growth . . .**




**. . . and earnings improve some . . .**

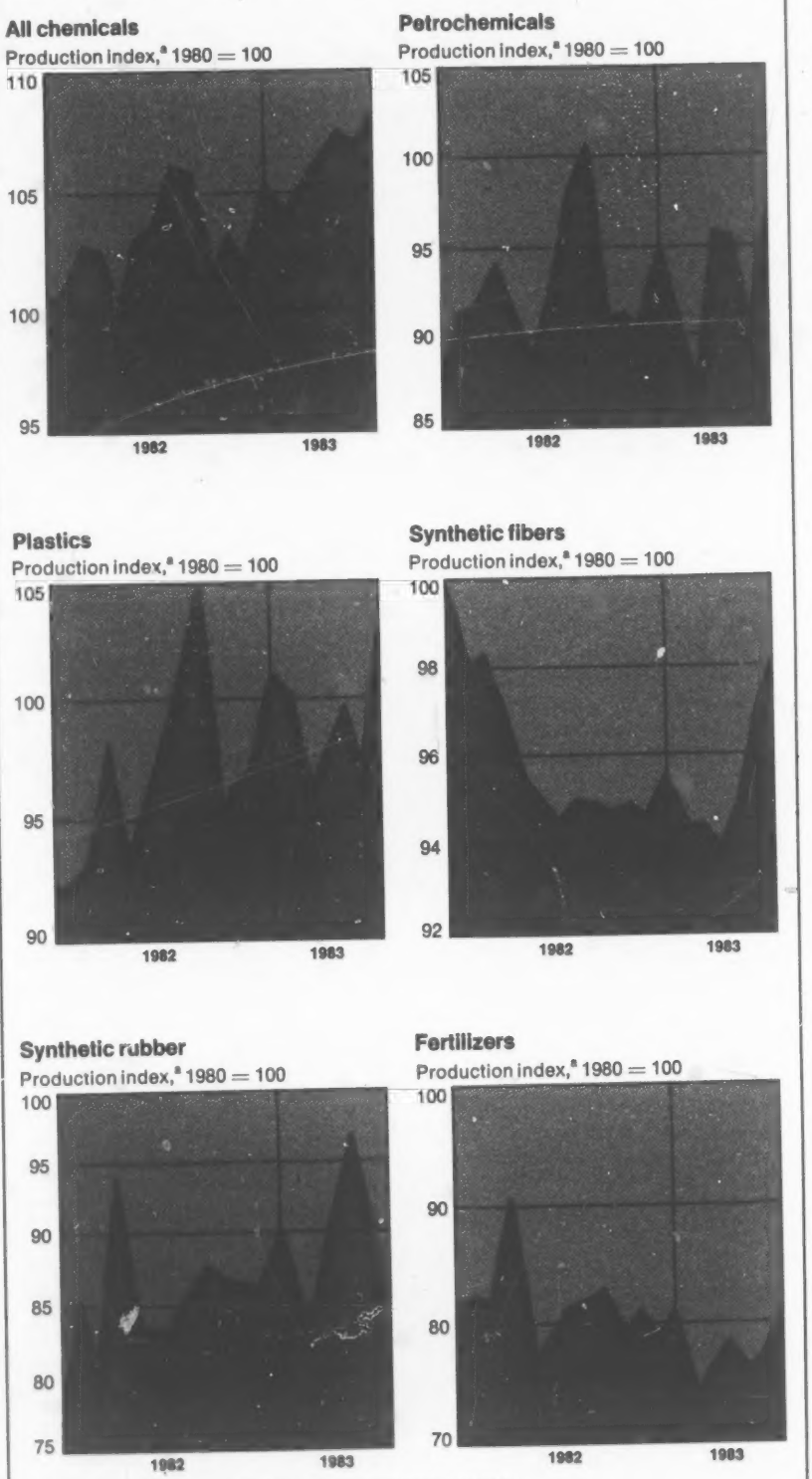



**. . . but profit margins are still down**




a Estimated. **Note:** Data for fiscal years ending March 31. Based on results of 10 leading Japanese petrochemical companies: Mitsubishi Chemical Industries, Sumitomo Chemical, Asahi Chemical Industry, Toray Industries, Mitsui Toatsu Chemicals, Teijin, Showa Denko, Mitsubishi Petrochemical, Dainippon Ink & Chemicals, and Sekisui Chemical. **Source:** Toyo Keizai Shinposha

## Chemical production generally is edging higher this year




a Seasonally adjusted. **Source:** Ministry of International Trade & Industry

scrapping schedules have been set for some time. Recently, 21 PVC companies submitted plans to MITI for cutting their capacity. They hope to shut down plants that can make 450,000 metric tons per year—22% of the industry's total—by next February. The plants should be closed permanently by March 1985.

Ammonia producers, meanwhile, have just about completed scrapping 20%, or 660,000 metric tons, of their annual capacity. Urea capacity has been cut 35% or 810,000 metric tons per year. Other industry sectors, such as caustic-chlorine producers and styrene producers, still are considering whether to seek relief under the industrial structure law.

Planning for joint efforts to scrap excess capacity and to form joint sales companies is one thing. Putting these plans into action is more difficult. And it probably will become even more difficult as demand improves, as it now is doing for chemicals. Companies will want to get as much of the expanding market as they can for themselves.

Yet, Japanese petrochemical companies seem sincere in their efforts. To make sure that the cartel plan is, indeed, implemented, the industry has devised its own penalty rule. If a company fails to scrap its agreed-upon capacity by the target date, it will be fined a penalty based on the annual capacity of the plant.

Meanwhile, chemical companies in Japan are enjoying the fresh breezes of economic recovery. Domestic demand is up; exports are increasing; and production is rising as a result. Growth in chemical imports has slowed. Prices of naphtha, the chief petrochemical feedstock in Japan, have leveled off, and Japanese companies have pushed through some much-needed price increases.

This beneficial combination is helping to put some black ink back in company financial statements. Although profits were depressed for the entire chemical industry during the first half of fiscal 1983 (March 1983 to September 1983), companies are expecting to do much better in the second half.

Many companies are revising their second-half earnings estimates upwards, sharply in some cases. And one recent industry survey, covering

the chemical industry as a whole, estimates that profits, which declined nearly 20% during the first half of fiscal 1983, will increase 76% during the second half. These figures are based on a comparison with the previous six-month periods. But what they indicate is that, when the fiscal year ends next March, chemical industry profits should be up nearly 50% from fiscal 1982.

Japanese chemical companies are benefiting as much, if not more, from the strong economic recovery in the U.S. as they are from the more tepid recovery in Japan. With demand improving in their own markets, U.S. chemical companies aren't pushing exports to Japan so hard as before. And with less competition from U.S. companies in Japan's important export markets in Southeast Asia, the country's exports are increasing once more.

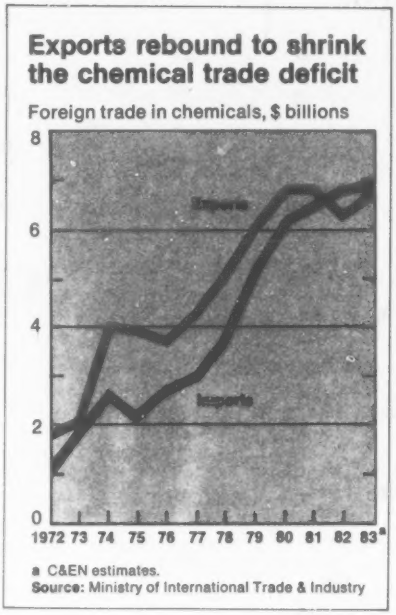
Based on 10-month figures, Japan's chemical exports are expected to increase 7% this year to $6.8 billion. Imports, meanwhile, will inch ahead only 0.4% to $6.85 billion. Some trade analysts suggest that exports will be higher and that imports will be lower than these estimates. If they are right, Japan will regain a surplus in its chemical trade—a surplus that it lost last year.

Chemical imports are a problem that won't go away entirely, however. Imports of ethylene dichloride, for example, hit record levels this year. Methanol imports from Saudi Arabia have started coming into Japan in large volumes and are certain to continue. These imports, along with some material from China, recently have raised total Japanese methanol imports to an average 100,000 metric tons per month.

Starting next February, Sumitomo Chemical plans to import propylene, butadiene, and benzene from Singapore when a petrochemical complex there comes on stream. Tariffs on some chemical products also will be lowered next year, ahead of schedule. And, over the long haul, much of the petrochemical production in Saudi Arabia will be earmarked for Japan.

Despite the improvement this year, Japan's chemical industry still has some problems to resolve before it can get into high gear. It may take several more years before the industry is lean enough to remain consistently in the black. □

## Exports rebound to shrink the chemical trade deficit




a C&EN estimates.
**Source:** Ministry of International Trade & Industry

## Production gains are few and generally sluggish this year

| Thousands of metric tons unless otherwise indicated | 1982 | Seven months 1983 | Seven months 1982 | % change |
|---|---|---|---|---|
| INORGANIC CHEMICALS | | | | |
| Ammonium chloride | 486 | 265 | 285 | −7% |
| Ammonium sulfate | 1689 | 985 | 999 | −1 |
| Calcium carbide | 483 | 295 | 297 | −1 |
| Calcium superphosphate | 527 | 343 | 317 | 8 |
| Carbon black | 504 | 319 | 299 | 7 |
| Chlorine, liquid | 794 | 472 | 474 | 0 |
| Hydrochloric acid | 551 | 296 | 326 | −9 |
| Nitrogen[a] | 5236 | 3031 | 3071 | −1 |
| Oxygen[a] | 6493 | 3653 | 3867 | −6 |
| Sodium carbonate | 1162 | 670 | 669 | 0 |
| Sodium hydroxide | 2792 | 1622 | 1644 | −1 |
| Sodium silicate | 650 | 339 | 376 | −10 |
| Sulfuric acid | 6530 | 3863 | 3767 | 2 |
| Titanium dioxide | 184 | 116 | 108 | 7 |
| ORGANIC CHEMICALS | | | | |
| Acetaldehyde | 279 | 137 | 168 | −18 |
| Acetic acid | 353 | 171 | 206 | −17 |
| Acetone | 229 | 137 | 126 | 9 |
| Acrylonitrile | 489 | 249 | 286 | −13 |
| Benzene[b] | 1588 | 942 | 904 | 4 |
| Butadiene | 522 | 308 | 303 | 2 |
| Butanol | 234 | 126 | 129 | −2 |
| Caprolactam | 388 | 227 | 234 | −3 |
| Cyclohexane | 426 | 263 | 257 | 2 |
| Dioctyl phthalate | 221 | 128 | 127 | 1 |
| Ethylene | 3588 | 1952 | 2086 | −6 |
| Ethylene dichloride | 1548 | 947 | 882 | 7 |
| Ethylene glycol | 385 | 191 | 213 | −10 |
| Ethylene oxide | 471 | 257 | 268 | −4 |
| Methanol | 625 | 249 | 416 | −40 |
| Octanol | 226 | 116 | 123 | −6 |
| Phenol | 211 | 145 | 111 | 31 |
| Phthalic anhydride[b] | 159 | 96 | 99 | −3 |
| Propylene[c] | 2545 | 1490 | 1443 | 3 |
| Propylene glycol | 185 | 108 | 106 | 2 |
| Styrene | 1086 | 604 | 605 | 0 |
| Terephthalic acid | 649 | 408 | 362 | 13 |
| Toluene | 803 | 477 | 469 | 2 |
| Toluene diisocyanate | 67 | 40 | 35 | 14 |
| Xylene | 1225 | 740 | 698 | 6 |
| Urea | 1187 | 606 | 702 | −14 |
| PLASTICS | | | | |
| Phenolic resins | 281 | 170 | 164 | 4 |
| Polyethylene | 1674 | 931 | 981 | −5 |
| Polypropylene | 941 | 600 | 531 | 13 |
| Polystyrene | 1190 | 708 | 679 | 4 |
| Polyvinyl chloride | 1218 | 773 | 668 | 16 |
| SYNTHETIC RUBBER | 931 | 564 | 537 | 5 |

a Millions of cubic meters. b Petroleum-based product only. **Source:** Ministry of International Trade & Industry

**Petrochemical producers worry that government tax and pricing policies will cut them out of world markets**

**Earl V. Anderson,** C&EN New York

Canada

# Business is better but feedstock costs cause concern

Canadian chemical leaders are keeping one eye glued to their financial statements to convince themselves that the recovery they see is no mirage. As the year winds down, chemical production continues to bounce back from 1982's depressed levels. Sales and profits are improving. Some, if not all, expansion plans are being put back on the front burner.

Other focus, meanwhile, will be on Ottawa. By the end of the year, if the deadline is met, a blue ribbon task force will complete its detailed study of Canada's petrochemical future and submit its recommendations to the federal government.

Cynics point out that this is the third major study of the Canadian petrochemical industry in five years. But few are taking it lightly. The study is seen as a golden opportunity to get across to government officials just what it will take to assure the long-term future of both the natural gas-based petrochemical industry in Alberta and the oil-based industry centered in Sarnia, Ont., and Montreal, Que.

More important, of course, will be how the federal government acts upon whatever recommendations are made. The industry will be watching closely for these reactions next year.

It's difficult to conceive of the task force's avoiding the politically sensitive issue of the National Energy Program (NEP) and its impact upon petrochemical feedstock prices. W. Norman Kissick, president and chief operating officer of Union Carbide Canada—and a member of the petrochemical task force—says that the impact of NEP has been especially destructive. The industry now wonders, says Kissick, if it is going to be taxed out of existence.

In 1981, the Canadian petrochemical industry earned $345 million (Canadian) before taxes. In 1982, it lost $244 million—"a $600 million turn for the worse in one year," Kissick calls it.

True, the recession, both in Canada and in other countries where Canadian chemical exports took a beating, helped cause the collapse in Canadian chemical company fortunes. But many industry executives think that a more realistic taxation policy could have made the recession's impact less severe.

One part of the problem is the up-front taxes that Canadian petrochemical producers must pay for feedstock. Kissick estimates that these taxes represent 76% of the total for oil and 57% for natural gas.

The other part of the feedstock pricing problem is that Canadian oil and gas prices have been escalating while international prices have been declining. Canadians now pay about 98% of world prices for their oil, compared to the 85% ceiling that was promised originally under NEP. And, says A. E. F ,glestone, senior vice president of Alberta Gas Chemicals Ltd., natural gas prices have doubled in two years.

Canada is no longer one of the low-cost-gas nations of the world, says Egglestone. Prices may be low compared to those in the U.S. But Egglestone thinks that the U.S. is no longer in competition for world

**Output rebounds, but not to earlier levels for many chemicals**

| Thousands of metric tons | 1983[a] | 1982 | 1981 | 1980 | 1979 | 1978 |
|---|---|---|---|---|---|---|
| Ammonia | 2760 | 2509 | 2654 | 2555 | 2405 | 2398 |
| Ammonium nitrate | 915 | 1018 | 1212 | 873 | 914 | 871 |
| Ammonium phosphate | 1140 | 888 | 1355 | 1466 | 1336 | 1178 |
| Benzene | 560 | 504 | 571 | 604 | 492 | 555 |
| Chlorine | 1330 | 1233 | 1292 | 1303 | 1031 | 941 |
| Ethylene | 1200 | 1013 | 1330 | 1184 | 1014 | 826 |
| Hydrochloric acid, 100% | 155 | 135 | 186 | 177 | 154 | 155 |
| Phosphoric acid, 100% $P_2O_5$ | 570 | 503 | 744 | 808 | 748 | 554 |
| Polyethylene | 590 | 571 | 633 | 641 | 628 | 478 |
| Polypropylene | 660 | 618 | 671 | 590 | na | na |
| Polyvinyl chloride | 240 | 194 | 222 | 190 | 145 | 125 |
| Sodium chlorate | 290 | 264 | 255 | 245 | 224 | 199 |
| Sodium hydroxide | 1470 | 1367 | 1458 | 1459 | 1138 | 1036 |
| Sulfuric acid | 3410 | 3131 | 4117 | 4295 | 3666 | 3261 |
| Urea | 1365 | 1231 | 1303 | 1274 | 1212 | 1217 |

a C&EN estimates. na = not available. Source: Statistics Canada

petrochemical markets. He says that Canadian governments, both federal and provincial, have "outtaxed and outpriced Canadian natural gas" to the point that new gas-based petrochemical plants are no longer competitive in world markets.

Obviously, the hydrocarbon taxation and pricing issue will be an important one in the coming year. It also figures to be a thorny one, because it touches many politically sensitive nerves.

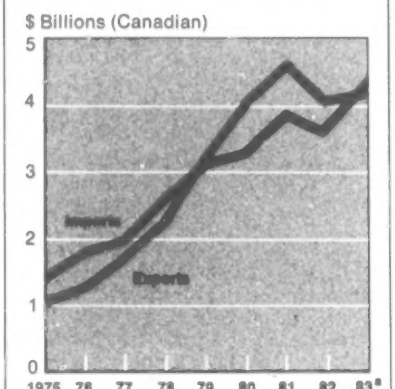
Meanwhile, even without a change in feedstock price and tax policies, the Canadian chemical industry is recovering from the 1982 recession. The upturn that started early in 1983 became even stronger as the year progressed.

Output of ethylene, for instance, will total about 1.2 million metric tons, 18% higher than last year, reflecting increased demand for its derivatives. Although total polyethylene production will increase only about 3%, other derivatives are faring much better.

Polyvinyl chloride (PVC) is a good example. For the year, PVC output probably will be 240,000 metric tons—24% higher than last year.

This means that PVC production will be higher than ever before. PVC is benefiting from a recovery in Canadian auto and housing markets, and an Esso Chemical Canada expansion this year at Sarnia, Ont., has helped the supply picture.

**Exports rise, but deficit returns to chemical trade**




a C&EN estimates. **Source:** Statistics Canada

Even in the less glamorous, but important inorganic chemicals segment of the industry, business is perking up. Output of sulfuric acid, which had been sluggish for most of the year, gathered momentum in the third quarter as demand at smelters increased. Hydrochloric acid production, thanks in part to exports to the U.S., will be 15% higher in 1983 than it was last year. Caustic soda and chlorine production both will be about 8% ahead of last year, again because of brisk export sales this year.

These higher production rates, and the higher-volume sales that they imply, are having a favorable impact on chemical company balance sheets. The combined nine-month sales of the four major publicly reporting companies, C-I-L Inc., Celanese Canada, Du Pont Canada, and Union Carbide Canada, increased 5% to $2.5 billion this year.

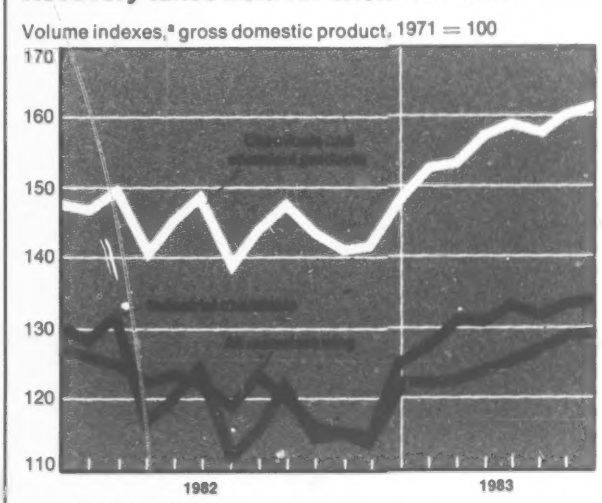
Just as important, if not more so, net income for the period was $42.4 million. That may not represent much of a profit margin, but compared to the $10.4 million loss of last year, it is a welcome improvement.

Nevertheless, export sales, particularly of petrochemicals, still are hard to come by. Through the first nine months, Du Pont Canada's export sales were off 8%. And Union Carbide Canada, which reported that domestic sales were up 13%, suffered a 46% decline in export business.

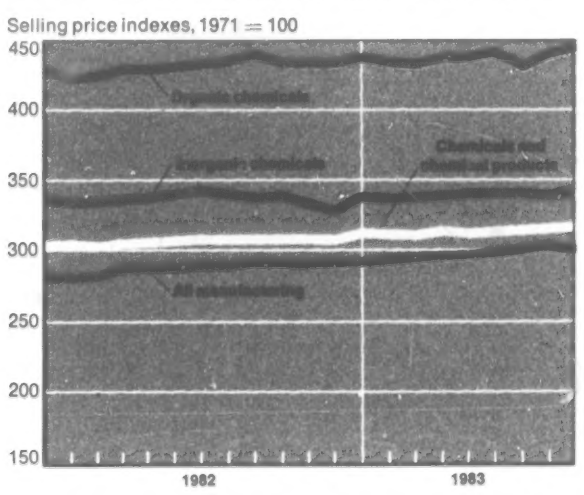
As a result, Canada will return to its traditional foreign trade deficit in chemicals this year. The country's chemical trade shifted into a surplus in 1979 and maintained that surplus through last year. This year, however, chemical exports probably will increase only 3% to $4.2 billion, while Canada's revived economy pulls in 20% more ($4.3 billion) in chemical imports than in 1982.

This is a situation that the Canadian chemical industry hopes to reverse once again next year. And it hopes that a more realistic government policy toward petrochemical feedstocks will emerge to make the task easier. □

**Recovery takes hold for chemical makers . . .**

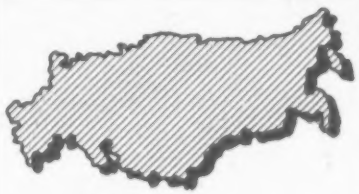



**. . . but they find that price hikes come hard**




a Seasonally adjusted. **Source:** Statistics Canada

# Slow growth continues in Soviet Union and East Europe



**Andropov unlikely to make basic reforms in economic system needed to get chemical and other industries moving again**

**Richard J. Seltzer,** C&EN Washington

When Yuri Andropov succeeded Leonid Brezhnev a little over a year ago as Soviet leader, many western analysts placed the Soviet Union at a major turning point comparable to the post-Lenin and post-Stalin periods. The analysts pointed to a host of unresolved problems and issues. Economic and industrial growth rates were falling. Decisions were growing difficult on allocation of resources between military and civilian needs. There was an increasing burden from the stagnating economies of the East European members of the Council for Mutual Economic Assistance (CMEA)—Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania.

Many observers viewed the choosing of Andropov as aimed at tackling these problems—installing a strong leader to get the country moving again, and with it all of East Europe. Indeed, Andropov began by openly acknowledging the U.S.S.R.'s economic problems and calling for steps to correct them. Western analysts speculated that he might undertake some of the fundamental structural reforms they believe necessary to solve Soviet economic and industrial problems—for example, introducing into the central planning system a measure of decentralization and market incentives, such as Hungary is trying.

However, some western analysts now say, Andropov's rule is likely to amount to a "transition period," rather than a time of initiating new conditions, even if Andropov should recover sufficiently from his recent illness to maintain his leadership for quite some time to come. His approach has been to crack down on worker discipline and on corruption, trying to make the existing system work better, rather than seeking structural changes that might threaten loss of political control by party and government bureaucracies. Thus, any steps toward solution of the basic problems apparently must await new leadership. In the meantime, the region's economies will continue to limp along.

This, indeed, is what appears to be happening. Information is always sparse about Soviet and East European economic goals and results, and western analysts always doubt the reliability of official statistics. This year, even less information is available: Apparently because of Andropov's illness, the Soviets have postponed from November to the end of December the annual meetings of the Communist Party Central Committee and the Supreme Soviet (the nominal Soviet parliament).

However, the Soviet and East European economies and industries generally show slow or no growth this year, and the same is likely next year, continuing the pattern of slower growth that began in 1979. Even the modest goals of their current five-year plans (1981–85) generally are not being met.

Real gross national product for the six East European CMEA members declined in 1982 for the third year in a row (down 0.2%, compared to drops of 1.0% in 1981 and 0.1% in 1980), according to Central Intelligence Agency calculations. (CIA figures generally are lower than official Soviet statistics, because the agency tries to eliminate double counting, disguised inflation, and other upward biases.) The goal was a relatively modest 2.4% increase. By contrast, gross national product for the six nations rose 4.7% a year from 1971 to 1975. The regional average in 1982 was particularly depressed by Poland's decline of 4.0%.

Soviet gross national product grew just 2.0% in 1982, compared to a goal of 3.0%. This was less than half the growth rates from 1971 to 1977, and follows increases of only 0.4% in 1979, 1.7% in 1980, and 2.2% in 1981. Growth is expected to be about 2% again this year (the goal was 3.3%).

Industrial production for the region also is growing at a slower pace. Overall, industrial output for the six CMEA members rose just 0.7% in 1982, after a drop of 2.0% in 1981, according to CIA estimates (the target was a 2.8% gain). A drop of 3.9% in Poland's output lowered the average somewhat, but the average of the other five nations also shows slowing growth. The six-nation goal for 1983, a 4.1% increase, is unlikely to be met.

The U.S.S.R.'s industrial production rose just 2.5% in 1982, according to CIA figures, only half the goal of 4.7% or the average annual growth, also 4.7%, set by the five-year plan. The goal for 1983 is a modest 3.2%, showing that the Soviets already have abandoned hope of fulfilling the plan's target.

Chemical and rubber production slowed in 1981 and 1982 in most East European countries, according to official figures. In Czechoslovakia, it dropped 0.3% in 1982 (the target was 5.1 to 5.9% average annual growth in 1981–85). In 1981, Czech output rose only 2% compared to an average increase of 6% a year in the five previ-

## Growth stronger for chemicals in Soviet Union this year

| Thousands of metric tons unless otherwise indicated | 10 months 1983 | 1982 | 1981 | 1980 |
|---|---|---|---|---|
| **Mineral fertilizers**[a] | 24,600 | 26,700 | 25,990 | 24,760 |
| % change from previous year | 10% | 3% | 5% | 12% |
| Nitrogen (N) | na | 11,200 | 10,705 | 10,241 |
| % change from previous year | na | 5% | 5% | 12% |
| Phosphate ($P_2O_5$)[b] | na | 7,200 | 6,836 | 6,455 |
| % change from previous year | na | 5% | 6% | 2% |
| Potassium ($K_2O$) | na | 8,300 | 8,449 | 8,064 |
| % change from previous year | na | −2% | 5% | 21% |
| **Sulfuric acid** | 20,400 | 23,800 | 24,095 | 23,033 |
| % change from previous year | 4% | −1% | 5% | 3% |
| **Ammonia**[c] | na | 15,400 | 14,718 | 13,762 |
| % change from previous year | na | 5% | 7% | 12% |
| **Plastics**[d] | 3,600 | 4,057 | 4,089 | 3,637 |
| % change from previous year | 8% | −1% | 12% | 5% |
| **Sodium hydroxide** | 2,400 | 2,783 | 2,757 | 2,755 |
| % change from previous year | 2% | 1% | 0% | 3% |
| **Synthetic rubber** | na | 1,815 | 1,860 | 1,880 |
| % change from previous year | na | −2% | −1% | 1% |
| **Chemical fibers and yarns**[e] | 1,100 | 1,229 | 1,218 | 1,200 |
| % change from previous year | 7% | 1% | 1% | 8% |
| **Pesticides** | 465 | 533 | 504 | 474 |
| % change from previous year | 5% | 6% | 6% | 0% |

a Nutrient content basis; includes some products used for technical purposes. b Includes ground phosphate rock for direct application and phosphate animals feeds. c Nitrogen content basis. d Includes resins for synthetic fibers. e Excludes olefins and textile glass. na = not available. **Sources:** Central Intelligence Agency, Department of Commerce, Textile Economics Bureau

## Output slumps for much of East Europe's chemical industry

| Thousands of metric tons in 1982, unless otherwise noted | Bulgaria | Czecho-slovakia | East Germany | Hungary | Poland | Romania | Total |
|---|---|---|---|---|---|---|---|
| **Mineral fertilizers**[a] | 999 | na | 4668 | na | 2283 | 2700 | na |
| % change from 1981 | −1% | na | −2% | na | 2% | 2% | na |
| Nitrogen (N) | 760 | 567 | 948 | 571 | 1297 | na | na |
| % change from 1981 | 1% | 5% | −2% | −3% | 2% | na | na |
| Phosphate ($P_2O_5$) | 239 | 335[b] | 286[b] | 155 | 868 | na | na |
| % change from 1981 | −7% | −1% | −21% | −2% | 0% | na | na |
| Potassium ($K_2O$) | — | na | 3434 | na | 118[c] | na | na |
| % change from 1981 | — | na | −1% | na | 16% | na | na |
| **Sulfuric acid** | 892 | 1252 | 920 | 600 | 2682 | 1600 | 7946 |
| % change from 1981 | −3% | −5% | −3% | 10% | −3% | −12% | −4% |
| **Plastics** | 325 | 956 | 990 | 326 | 438 | na | na |
| % change from 1981 | 12% | 5% | −1% | 4% | −8% | na | na |
| **Sodium hydroxide** | 155 | 315 | 695 | 178[d] | 363 | na | na |
| % change from 1981 | 3% | −4% | 10% | −1% | −9% | na | na |
| **Synthetic rubber** | 30 | 65 | 155 | — | 100 | 160 | 510 |
| % change from 1981 | 0% | 3% | 0% | — | −10% | 10% | 1% |
| **Chemical fibers and yarns**[e] | 90 | 157 | 292 | 28 | 193 | 214 | 974 |
| % change from 1981 | −5% | 9% | −4% | −4% | 5% | −2% | 0% |

a Nutrient content basis. b Including production of ground phosphate rock for direct application and phosphate animal feeds. c Imported potash added to domestically produced nitrogen and phosphate to form multinutrient fertilizer. d Including regenerated sodium hydroxide. e Excluding olefins and textile glass. na = not available. **Sources:** Central Intelligence Agency, Textile Economics Bureau, United Nations Economic Commission for Europe

ous years. Bulgaria's output rose just 1% in 1982 (compared to a target of nearly 8% a year for 1981 to 1985 and gains of 4% in 1981 and 11% in 1980). And Hungary's production was up just 2% in 1982 (output rose about 6% a year from 1976 to 1980).

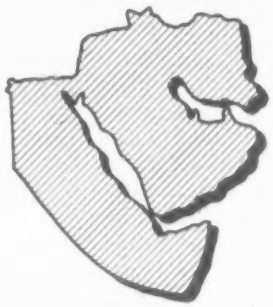
Soviet chemical and rubber output was up just 3% last year, only half the target for yearly growth between 1981 and 1985. It also was only a bit more than half the increases registered in 1981 and 1980, and far below the 7 to 10% yearly growth rates of the early 1970s.

This year, through October, Soviet chemical production is again up just 3%, compared to the same period last year. However, output of several chemicals has rebounded from slow growth or declines last year. For instance, plastics are up 8%, versus a drop of 1% last year, and output of sulfuric acid is up 4%, chemical fibers and yarns 7%, and mineral fertilizers 10%. Thus, the Soviets apparently will exceed their goals this year for growth of 9% in output of fertilizers and come close to the 9% goals for plastics and fibers.

The slowdown in the East European chemical industry occurs within a general framework of cutbacks in capital investment and imports, reflecting concern to reduce foreign debt. A major factor in the chemical slowdown—as in other energy- and material-intensive industries—is declining domestic production of energy and raw materials, with limited possibilities for imported substitutes. For example, several sources report cuts of 10% in crude oil imports by East European countries from the U.S.S.R., which produces 98% of the region's oil. The Soviet Union has raised its oil prices within CMEA and is trying to conserve oil for use predominantly as a raw material by processing industries while increasing the share of coal and natural gas in the fuel supply.

Another reason for the slowdown is that restructuring of the chemical industry is being given priority over expansion of existing production. A general aim is to increase output of plastics, synthetic fibers, pharmaceuticals, and cosmetics. Much attention also is devoted to automation, electronics, and more effective use of resources and energy. □

# New chemical complexes are beginning to come on stream



**Saudi Arabia started up two plants this year and has six more planned this year and next**

**Dermot A. O'Sullivan,** C&EN London
**Richard J. Seltzer,** C&EN Washington

This year saw startup of two of the clutch of Saudi Arabia's new chemical plants. A methanol unit came on stream in February, followed a few weeks later by a fertilizer complex. Routine deliveries outside the country are under way.

Methanol is being produced by Saudi Methanol, a company jointly owned by Saudi Basic Industries Corp. (SABIC) and a consortium of Japanese firms, in a plant with an annual capacity of 1.3 billion lb. Ammonia (725 million lb annual capacity) and urea (1.2 billion lb) are made by Al-Jubail Fertilizer Co., in which SABIC is linked with Taiwan Fertilizer Co. Both operations are at Al-Jubail, the emerging industrial center in the east of the country.

That the plants were on schedule and within budget puts the lie to the opinion held until recently that it would be extremely difficult to establish sophisticated chemical operations in the harsh Saudi environment and find the skilled technicians to run them. It served also as a stark reminder to managers in Europe, the U.S., and elsewhere that the time is fast approaching when other petrochemicals from Al-Jubail and from Yanbu, in the west, will be traded internationally.

Next year and the year following will see startup of six major complexes. All told, their rated annual capacity will be 3.5 billion lb of ethylene, 1.4 billion lb of additional methanol, 1.3 billion lb of linear-low-density polyethylene, 1.1 billion lb of ethylene glycol, 650 million lb of styrene, 620 million lb of ethanol, and 200 million lb of high-density polyethylene, not counting such intermediates as caustic soda and ethylene dichloride. SABIC is involved in all of them. Its partners in the various companies include Celanese, Exxon Chemical, Mobil Chemical, Shell Oil, and Texas Eastern.

Nor will expansion stop there. Planned are 660 million lb-a-year vinyl chloride and 440 million lb-a-year polyvinyl chloride units, and possibly one for making 155 million lb a year of polystyrene. Other projects entail annual capacity of 1.3 billion lb of ammonia, 1.1 billion lb of methyl *tert*-butyl ether, 275 million lb of butadiene, 175 million lb of butene-1, and 90 million lb of polyisoprene.

Some of the output, of course, will be used domestically. Low domestic consumption figures point to plenty of room for local growth. But much of it is slated for world markets.

Because of the sheer scale of developments in Saudi Arabia, it's easy to overlook events elsewhere in the Middle East. But moves have been under way in other countries of the region that also will lead to increased chemical output and exports.

In Iran, for instance, there was a revival late this year of plans for the massive chemical complex at Bandar Khomeini, a joint venture of National Iranian Oil Co. and a consortium of Japanese companies. The Iranians bowed to demands to pay $55 million that the Japanese claimed was owed them, thereby clearing the way to move ahead with the project.

A range of products will be made there, centering on a 660 million lb-a-year ethylene cracker and a 1.1 billion lb-a-year aromatics unit. The complex, 85% complete before it was stalled by the war between Iraq and Iran, has been hit in a number of bombing raids. Although originally slated to be completed last year, it now is more likely that the final phase of construction will be withheld until the war is ended.

Israel, meanwhile, faces what many observers call its most severe economic crisis. Inflation exceeds 150%; industrial production, gross national product (in constant prices), and exports are static or declining; and the trade deficit and external debt are soaring. The government has responded with an "export-oriented austerity policy," involving a 7 to 9% cut in the standard of living, heavy cutbacks in government domestic spending, and intensive efforts to promote exports and reduce imports.

Priority will go to high-technology industries. The chemical industry (including rubber, plastics, and mineral products) accounts for almost a third of industrial production and of industrial exports (excluding processed diamonds). Chemical exports totaled just over $1 billion in 1980 and 1981, but dropped to $958 million in 1982 with the world recession and declining currency values in Western Europe. Through October this year, chemical exports rose 3% and total industrial exports dropped 5%. □

**Austerity measures have stalled chemical growth but investment in petrochemicals continues to have high priority**

**Earl V. Anderson,** C&EN New York

## Mexico

# Demand for chemicals sags as Mexico fights financial crisis

The Mexican chemical industry, like most Mexican industries, is suffering through a dismal year. Faced with Mexico's worst financial crisis in decades, President Miguel de la Madrid Hurtado, who took office a year ago at the height of the financial storm, implemented some tough economic measures to keep the country from defaulting on its $80 billion foreign debt.

These measures won him plaudits from the international financial community, but they brought to a screeching halt the overheated, oil-fed economic growth to which Mexicans had become accustomed. Mexico's chemical industry felt the impact.

Growth in the domestic market, which had been averaging 10% annually for several years, slipped to 2 to 3% in 1982. This year, domestic demand for chemicals probably will be down 5 to 10%, depending upon the sector of the chemical industry.

With little or no foreign exchange available, imports of sorely needed raw materials and equipment have dried up. Investment has dwindled. Financial crises are a common problem among chemical companies.

Even within Mexico, raw material supplies are a problem. Many privately held companies in the secondary petrochemical industry complain about uncertain and inadequate shipments of raw materials from Petróleos Mexicanos (Pemex), the government-owned petroleum company that has sole jurisdiction over primary petrochemical output in Mexico.

However, the mood among chemical industry leaders is not to dwell on past and present problems, but to plan ahead for a resumption of growth. One vital factor is on their side. In Mexico, the petrochemical industry is considered a priority industry.

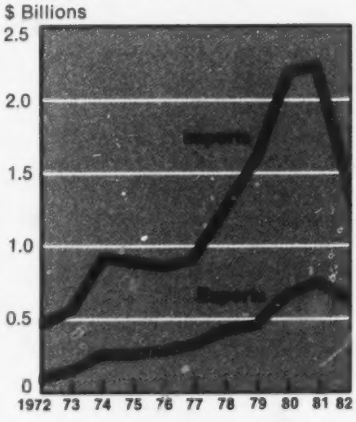
Government leaders stress repeatedly that Pemex's huge investments in petrochemical plants will continue, although the company will be more selective in deciding which investments come first. Meanwhile, the government has high hopes that its petrochemical industry can become not only less dependent on imports but a significant exporter as well, earning much-needed foreign exchange.

A trend to watch in Mexico is the extent to which private companies in the secondary chemical industry will be able to help plan future investments in the public petrochemical sector. There's no doubt that these companies want to be consulted when public investment and even regulations that affect the chemical industry are considered. They feel that cooperation between the two is vital.

Apparently, the government feels the same way. It has asked ANIQ (the Mexican Chemical Industry Association) to form a consulting committee to mesh with government agencies on both primary and secondary petrochemical matters.

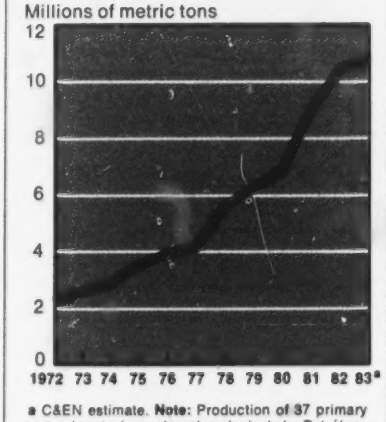
If this cooperative mood survives, industry leaders feel they can lay the groundwork for solid medium- and long-term growth. Meanwhile, they will be happy if next year brings them even a 2 to 4% increase in domestic sales. □

**Imports of chemicals nosedived last year**




**Source:** Asociación Nacional de la Industria Química (ANIQ)

**Growth in output slows for basic petrochemicals**




a C&EN estimate. **Note:** Production of 37 primary petrochemicals produced exclusively by Petróleos Mexicanos (Pemex). **Source:** Pemex

# Brazil brings chemical foreign trade into balance

**Although domestic demand is stagnant, exports are up sharply and imports have been strongly curtailed**

**Earl V. Anderson,** C&EN New York

"The (Brazilian) chemical industry has a reputation of being the bad little boy that imports," says Carlos Mariani Bittencourt, president of Abiquim (Associação Brasileira da Indústria Química e de Produtos Derivados), the Brazilian chemical industry's trade association. "But this year, we are bringing our exports and imports into balance."

Mariani is right, of course, and it gives him and everyone else associated with the Brazilian chemical industry a lot of pleasure to get the upper hand over the industry's detractors. With Brazil's $90 billion debt raising havoc with the country's economy, imports that drain precious foreign exchange are not particularly popular—especially imports of crude oil from which price-subsidized naphtha is produced for petrochemical feedstock.

But for Brazil's chemical industry in general, and for the petrochemical industry in particular, the two rules of the day are import substitution and export expansion. Import substitution is nothing new to Brazil. It has helped to fuel Brazil's economic miracle of the past two decades that ended with the country's liquidity crisis. Now, import substitution is getting a boost from that crisis.

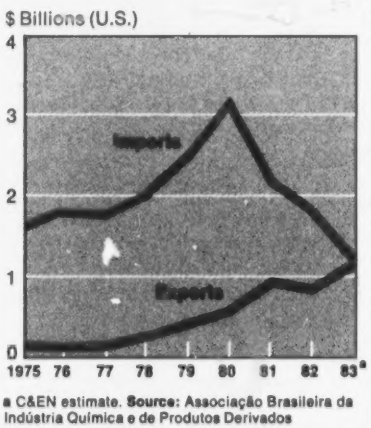
Until a few years ago, import substitution wasn't part of the chemical industry's game plan. In 1980, for instance, chemical imports hit $3.1 billion and gave Brazil a chemical trade deficit of $2.6 billion.

Since then, chemical imports have dropped rapidly—to $2 billion in 1981 and $1.8 billion last year. This year, Abiquim estimates, chemical imports will plunge 34% to only $1.2 billion.

On the other side of the coin, chemical exports have climbed sharply since 1980. In 1981, they jumped 67% to $924 million before sliding back to $839 million during the 1982 world recession. This year, Brazil's chemical exports are bouncing back with a vengeance. Abiquim expects them to reach $1.2 billion, matching chemical imports and erasing the country's chemical trade deficit. Government statistics through the third quarter indicate that this could, indeed, happen.

Next year, if developments pan out as expected, Brazil will have a chemical trade surplus for the first time. It no doubt will be small, but it will be a milestone nonetheless.

**Brazil finally balances its chemical trade**




a C&EN estimate. **Source:** Associação Brasileira da Indústria Química e de Produtos Derivados

Despite the pleasant ring to all of this, all is not well with Brazil's chemical industry. Much of the heralded import substitution in the chemical industry is by government fiat, not by choice. The result is that many firms are short of raw materials needed to run their plants.

And chemical exports are increasing primarily because they are the only alternative to a stagnant domestic market. There was considerable overcapacity in Brazil's chemical industry even before the new, southern petrochemical complex came on stream early this year at Porto Alegre in Rio Grande do Sul. The domestic chemical market probably will shrink 6 to 7% this year. Meanwhile, chemical production is likely to be 25% greater than the domestic market will absorb. This is the material that will be earmarked for exports, which could jump more than 40% this year.

It is this export effort, and certainly not the domestic market, that explains why Brazil's output of ethylene was running 18% higher than last year midway through the year, and why production of plastics ranged from 11 to 44% higher. With the exception of ammonia, gains such as these are confined to the petrochemical sector. Inorganics aren't faring nearly so well.

There's very little optimism among chemical industry leaders about domestic chemical demand in 1984. This means that the only course available to the industry in 1984 is more of the same—substitute for imports and push exports hard. □